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FINAL RECORD OF DECISION FOR OPERABLE UNIT 1 (OU 1) SITE 17 PETTIBONE CREEK NSTC GREAT LAKES IL

9/1/2013

TETRA TECH

RECORD OF DECISION

OU1, Site 17 – Pettibone Creek

Naval Station Great Lakes, Illinois

September 2013

SITE 17 – PETTIBONE CREEK (OPERABLE UNIT 1) NAVAL STATION GREAT LAKES, ILLINOIS

1.0 DECLARATION

1.1 SITE NAME AND LOCATION

Naval Station Great Lakes (NSGL)
United States Environmental Protection Agency (USEPA) ID No. IL7170024577
Operable Unit (OU) 1
Site 17 – Pettibone Creek
Great Lakes, Illinois

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the Selected Remedy for surface water and sediment at OU1, Site 17 – Pettibone Creek (Figure 1-1), which was chosen by the Department of the Navy, the lead agency, and Illinois Environmental Protection Agency (Illinois EPA), the support agency, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code (USC) §9601 et seq., as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Part 300 et seq., as amended. This decision is based on information contained in the Administrative Record file for the site. NSGL is an active facility, and environmental investigations at the facility are funded under Environmental Restoration, Navy (ER,N).

FIGURE 1-1. SITE LOCATION MAP

Site 17 is composed of two interconnected geographic areas, Pettibone Creek and the NSGL Boat Basin, and has been divided into two OUs. The Pettibone Creek portion of Site 17 has been designated as Operable Unit 1 (OU1), and the Boat Basin portion of Site 17 has been designated as Operable Unit 2 (OU2). This ROD addresses only OU1 (Pettibone Creek). A separate ROD will be issued at a later date to document the Navy's selected remedial alternative for the OU2 (Boat Basin).

1.3 DESCRIPTION OF SELECTED REMEDY

No CERCLA action is necessary for OU1 surface water or sediment because chemical concentrations in these media do not present unacceptable CERCLA risks. No other media (e.g., soil or groundwater) is associated with OU1. Human health and ecological risk assessments (RAs) concluded that the low chemical concentrations detected in surface water and sediment do not pose unacceptable risks to human health or the environment based on current and future exposure pathways. In addition, a

continuing source of sediment contamination likely from a combination of point and non-point, anthropogenic sources exists upstream of Pettibone Creek, as documented in the **Sediment Characterization Report in Support of the Feasibility Study (FS) for Site 17- Pettibone Creek** (Tetra Tech, July 2012) (referred to as the Sediment Characterization Report in this ROD).

1.4 STATUTORY DETERMINATION

The Navy has concluded that no CERCLA action is necessary to ensure protection of human health or the environment at Operable Unit 1 (OU1).

1.5 DATA CERTIFICATION CHECKLIST

The data included in this ROD are summarized in Table 1-1. Additional information can be found in the Administrative Record file for Naval Station Great Lakes.

TABLE 1-1. ROD DATA CERTIFICATION CHECKLIST

DATA	LOCATION IN ROD
Chemicals of Concern (COCs) and their respective concentrations	Not Applicable
Baseline risk represented by the COCs	Not Applicable
Cleanup objectives established for COCs and the basis for these levels	Not Applicable
How source materials constituting principal threats are addressed	Not Applicable
Current and reasonably anticipated future land use assumptions used in the risk assessment	Section 2.5.2, 2.7.1, and 2.7.2
Potential land and groundwater uses that will be available at the site as a result of the Selected Remedy	Section 2.6
Estimated capital and net present worth (NPW) costs; discount rate; and number of years over which the remedy costs are projected	Not Applicable
Key factors that led to the selection of the remedy	Not Applicable

If contamination posing an unacceptable risk to human health or the environment is discovered after execution of this ROD, the Navy will undertake necessary actions to continue to protect human health and the environment.

1.6 AUTHORIZING SIGNATURES

6 FEB 2014

W. A. Bulis, Captain, United States Navy
Commanding Officer, Naval Station Great Lakes

Date

4/17/14

Lisa Bonnett, Director, Illinois EPA

Date

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

NSGL, USEPA ID number IL7170024577, covers 1,202 acres of Lake County, which is located in northeastern Illinois north of the City of Chicago, and encompasses 1.5 miles of Lake Michigan shoreline. NSGL lies within both the North Branch Chicago River Drainage Basin and Lake Michigan North Drainage Basin. Precipitation runoff that does not infiltrate into the ground flows into the Skokie River or Pettibone Creek. Portions of NSGL drain into Lake Michigan through Pettibone Creek.

NSGL administers base operations and provides facilities and related support to training activities (e.g., Recruit Training Command at NSGL is the Navy's only boot camp) as well as a variety of other military commands located on base. Approximately 38,000 Naval recruits are trained each year at the NSGL campus.

A variety of land uses currently surround NSGL. Along the northern boundary of NSGL are the most highly urbanized and industrial areas. Much of the land beyond the northwestern site boundary comprises unincorporated vacant lands of North Chicago, except for scattered retail and residential properties. Adjacent to the western boundary are primarily industrial properties, and along the southern boundary is a mixture of public open space and residential land.

Site 17 is composed of two interconnected geographic areas, Pettibone Creek and the NSGL Boat Basin (see Figure 2-1). The two areas were evaluated as a single entity in the **Remedial Investigation** (RI) for Site 17. However, due to differences in the type and extent of potential contamination and degree of human health and ecological risk, Site 17 was divided into two OUs, OU1, including Pettibone Creek, and OU2, including the NSGL Boat Basin.

Pettibone Creek originates in North Chicago and enters the base at the northwestern corner of NSGL, meandering through the Mainside of NSGL and terminating in Lake Michigan. Pettibone Creek flows through a ravine (named Pettibone Creek Ravine) that ranges from approximately 50 to 100 feet in height with 30- to 70-degree slopes. The Pettibone Creek system consists of northern and southern branches that merge and flow eastward into Lake Michigan via the NSGL harbor system (inner and outer harbor). The North Branch of Pettibone Creek begins outside the base in an urbanized area zoned for light industry and is the discharge point for storm sewers from the City of North Chicago and NSGL. The North Branch of Pettibone Creek has a tributary which enters from the west about 900 to 1,000 feet south from where the North Branch enters NSGL. The South Branch originates in a residential area southwest of NSGL and flows east and then north through a private golf course before entering NSGL.

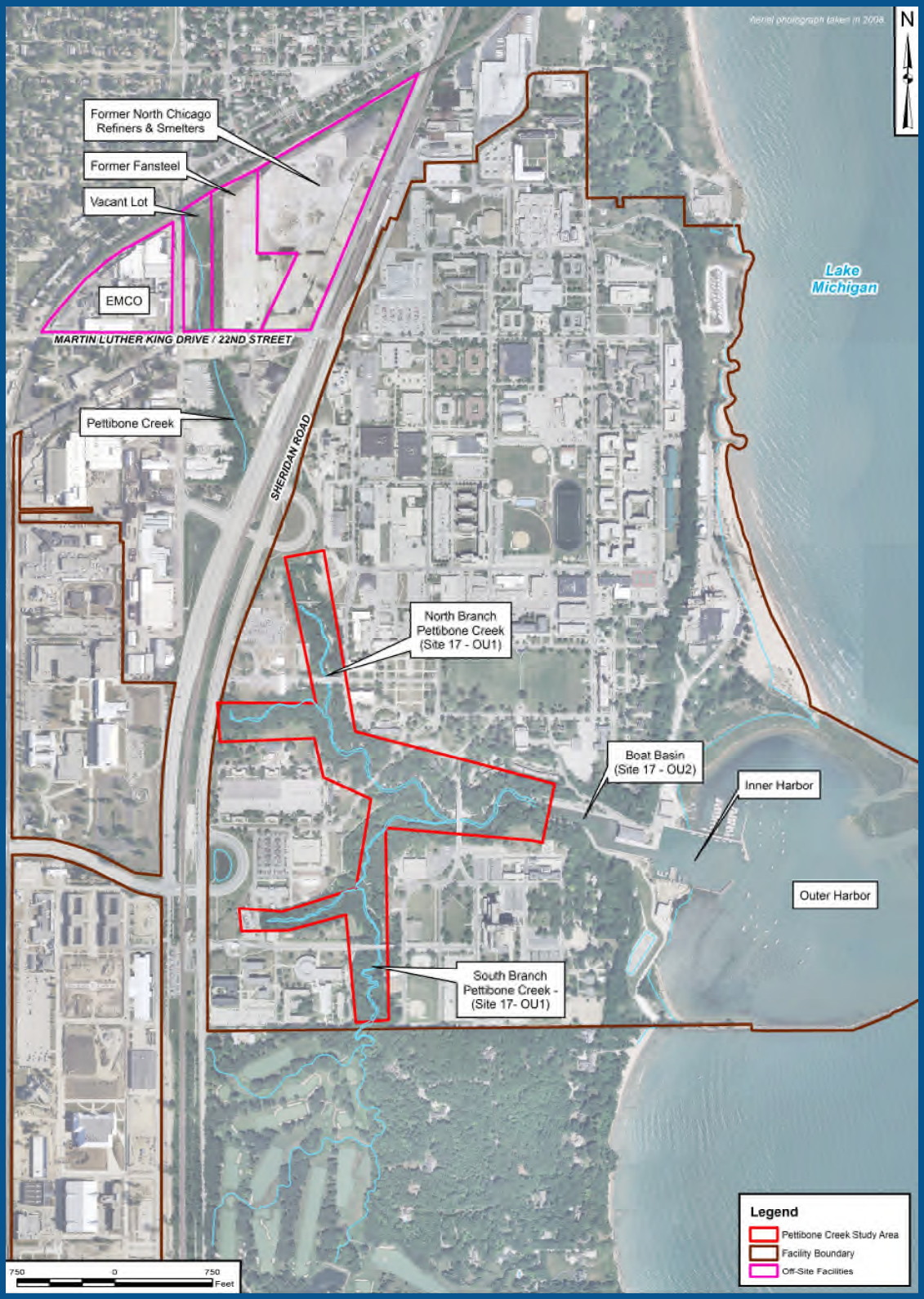
2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Investigations of Pettibone Creek were initiated in the 1970s and began as part of studies of abandoned industrial facilities in the City of North Chicago located upstream of NSGL (Figure 2-1). Several of the facilities [Fansteel, North Chicago Refiners and Smelters (NCRS), EMCO, and the Vacant Lot] were turn-of-the-century manufacturing facilities that produced tantalum mill products, non-ferrous metals, and zinc oxide. USEPA Region 5, Illinois EPA, and the Navy investigated these facilities to determine if contaminants such as volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals were present at those sites. These industries contributed to elevated levels of contaminants in Pettibone Creek sediment according to Illinois EPA and USEPA Region 5 (USEPA, April 2002a and 2002b and May 2002).

The following paragraphs describe activities at the industrial facilities and NSGL that may have impacted Pettibone Creek.

NCRS/R. Lavin & Sons - In 1941, R. Lavin & Sons (a division of NCRS) began operations including smelting and refining non-ferrous scrap metals and manufacture of brass and bronze ingots. The NCRS/R. Lavin & Sons facility occupied approximately 18 acres in North Chicago, northwest of NSGL.

FIGURE 2-1. SITE FACILITY MAP



While the facility was active, much of the operational portion of the facility was paved. This site was added to the list of CERCLA sites by Illinois EPA in August 1990 as a result of non-compliance with Resource Conservation and Recovery Act (RCRA) regulations. The NCRS/R. Lavin & Sons facility had four National Pollution Discharge Elimination System (NPDES) permitted discharge points into Pettibone Creek. These included stormwater discharges and discharges from overflow of a reservoir. Ideally, the water was recycled and reused during facility operations such as direct ingot cooling, smoke spray towers, flue trail dumpers, press heat exchangers, zinc die cast molds, cupola water jackets, and cupola slag granulation. However, hydraulic overload caused by precipitation or process difficulties led the reservoir to overflow into a stormwater sewer, which discharged into Pettibone Creek. According to Illinois EPA documents, R. Lavin & Sons violated its NPDES permit limits. R. Lavin & Sons ceased operations in 2001. The facility was demolished prior to 2008 and is now a vacant property proposed to be a strip mall.

Vacant Lot – The property was turned into a parking lot between 1936 and 1954. During this period, fill material of unknown composition was brought to the lot. An Illinois EPA Emergency Response Unit incident log indicates that the "area was filled in years ago with what appears to be materials similar to fly ash, foundry sand." Tailings/cinder-like material were found at depth in some areas of the lot, but in other areas it existed only at the surface. A USEPA contractor excavated and disposed of approximately 45,000 tons of PCB- and lead-contaminated soil and Pettibone creek sediments in 1998 from this site. In August 2000, EMCO Chemical Distributors completed the purchase of the Vacant Lot and uses the property for employee parking. Surface runoff from the Vacant Lot enters Pettibone Creek directly, as Pettibone Creek runs through the Vacant Lot from north to south, or from Martin Luther King Jr. Drive.

Fansteel - The facility produced tantalum mill products and formed non-ferrous metals until November 1990. The facility was the company's headquarters; however, this facility ceased operations and was demolished prior to 2008. The facility is now a vacant property proposed to be a strip mall. A CERCLA investigation was conducted at this facility in the early 1990s. In summer 1990, two aboveground tanks were removed after sampling indicated soil contamination in the tank area. Surface runoff from the Fansteel property flows south to Martin Luther King Jr. Drive where it enters a storm water outfall and discharges into Pettibone Creek (Illinois EPA, December 1995).

NSGL - The land comprising NSGL has been used to support Naval training since 1911. Some commercial activities and associated structures such as gas stations, underground storage tanks, drum storage, dry cleaners, and printers are located at the facility, but the facility does not conduct industrial-type activities. The base-wide **Initial Assessment Study** (IAS) (Rogers, Golden, & Halpern and BCM Eastern Inc., March 1986) identified 14 potential areas at NSGL where hazardous substances may have been released to the environment. The historical sources of contamination that may have resulted in contaminants discharging into Site 17-Pettibone Creek through storm water runoff include two transformer storage areas (PCBs), silk screen shop (VOCs and metals), and the service station (VOCs, SVOCs, and metals). The NSGL has investigated sites within NSGL property and addressed those that have potential to contaminate Pettibone Creek.

Previous Site 17 investigations and a brief description of findings are provided in Table 2-1. Recent investigations include the RI/RA conducted in 2001 (Tetra Tech, September 2003) and the sediment characterization conducted in 2012 (Tetra Tech, July 2012). Data from the 2001 RI/RA and 2012 Sediment Characterization Reports were used to assess potential human health and ecological risks from chemicals in surface water and sediment in Pettibone Creek. The 2001 RI included collection of surface water and sediment samples for analysis of VOCs, SVOCs, pesticides, PCBs, and metals. The results of the chemical analyses were used to identify the type, extent, and potential sources of the chemicals in the creek. They were also used in the RA to estimate risks associated with potential human exposure to surface water and sediment in the creek and to determine whether chemical concentrations in the creek could be impacting ecological receptors living in or near Pettibone Creek.

No unacceptable **human health risks** were identified during the RI. To address potential **ecological risks** identified during the RI, the Navy issued a **Proposed Plan** in 2008 outlining potential cleanup options but did not select a remedy as a result of the 2008 Proposed Plan. During a review of the data

and cleanup options, concerns were raised regarding upstream contamination beyond the NSGL property boundary. The Navy was concerned that upstream sources of contamination had not been addressed and may continue to contaminate sediment within the NSGL portion of the creek. The Navy contacted USEPA, Illinois EPA, U.S. Army Corps of Engineers, Illinois Department of Natural Resources, and National Oceanic and Atmospheric Administration regarding the issue and sought information on planned additional work in the upstream areas of Pettibone Creek. The Navy and Tetra Tech met with the above agencies (except USEPA) and developed a plan to conduct an additional investigation.

In 2012 the Navy, Illinois EPA, U.S. Army Corps of Engineers, and Illinois Department of Natural Resources concluded that it was necessary to further examine the distribution of chemical concentrations in Pettibone Creek sediment within NSGL and to determine, via site-specific biological studies, whether benthic invertebrates were being significantly impacted by site-related chemicals in the sediment in order to evaluate whether a remedial action was needed. In addition, it was also determined that surficial sediment and suspended sediment sampling was required to evaluate whether there is a continuing upstream source of contamination to Pettibone Creek. The results of the investigation were evaluated in the Sediment Characterization Report (Tetra Tech, July 2012) and are summarized below within Sections 2.5.3 and 2.7.2.

TABLE 2-1. PREVIOUS INVESTIGATIONS AND SITE DOCUMENTATION

Date	Report	Reference	Findings
1970 - 1971	Unknown	Illinois EPA	PCBs and pesticides detected in samples
May 1980	**Report on an Investigation of Sediment Contamination**	USEPA Region 5, May 1980	Contaminated sediment samples
July 1988	Health Assessment State Initial Site Evaluation, NCRS	Illinois Department of Public Health, June 1995	Surface soil and sediment samples collected from the NCRS/R. Lavin facility had elevated copper and lead levels. Concentrations of Aroclors and other metals were elevated in soil and sediment samples, but only lead and copper concentrations exceeded comparison values.
June 1990	Water Quality Study of Pettibone Creek	Illinois EPA, June 1990	Elevated levels of zinc, copper, and lead were detected in sediment samples collected downstream of the NCRS facility.
1991	NCRS Preliminary Facility Investigation	Illinois EPA, December 1991	Surface water samples were contaminated with VOCs and SVOCs.
November 1991	CERCLA Screening Site Inspection Analytical Results	Illinois EPA, February 1992	Metals and SVOCs were detected at concentrations three times greater than background levels.
August 1992	**Site Inspection Report for Pettibone Creek, Boat Basin and Harbor**	Halliburton NUS, June 1993	Elevated levels of SVOCs, pesticides, and metals, and to a lesser extent VOCs and Aroclor-1254, were detected in Pettibone Creek sediments.
September 1994	Vacant Lot Site Assessment	Illinois EPA	Elevated levels of metals, chlorinated solvents, polynuclear aromatic hydrocarbons (PAHs), pesticides, and PCBs were detected in soil and sediment samples at the Vacant Lot. Several offsite soil samples collected north and northwest of the site also had elevated levels of metals, PAHs, pesticides, and PCBs.
April 1994	**A Summary of Selected Background Conditions for Inorganics in Soil**	Illinois EPA, August 1994	VOCs, SVOCs, pesticides, metals, and other organic compounds were detected in sediment samples. Sediment samples collected along Pettibone Creek had several metals in the sample downstream of the NCRS outfall. Elevated levels of arsenic, beryllium, lead, trichloroethene (TCE), and PCBs were detected at the Vacant Lot site.

TABLE 2-1. PREVIOUS INVESTIGATIONS AND SITE DOCUMENTATION

Date	Report	Reference	Findings
1995	CERCLA Expanded Site Inspection Report	Illinois EPA, December 1995	Significant metals contamination was detected in sediment samples. Illinois EPA identified many potential sources that were part of facilities upstream of NSGL.
1997	Engineering Evaluation/Cost Analysis for the Vacant Lot	Ecology & Environment, Inc., October 1997	Contaminants (lead and PCBs and lead in leachate which exceeded the Toxicity Characteristic Leaching Procedure regulatory limit) were detected in soil samples from the Vacant Lot site and in sediment samples. Offsite active industrial discharge and storm water drainage into Pettibone Creek represent potential sources of this contamination.
1998	Final Report Removal of Lead and PCB Contaminated Soil at the Vacant Lot Site, North Chicago, Illinois	OHM Remediation Services Corp., October 1999	45,000 Tons of lead-contaminated soil and 2,000 tons of PCB-contaminated soil were excavated and disposed of from the Vacant Lot site. The removal action included excavation and disposal of 4,600 tons of lead-contaminated sediment and soil from Pettibone Creek within the boundary of the Vacant Lot site.
2000	Fansteel Briefing, Fansteel, Inc. Site; R. Lavin Briefing, R. Lavin & Sons, Inc.; Vacant Lot Briefing	USEPA, April 2002a; b; May 2002	Contaminants found in sediment samples
October 2000	Letter Report Pettibone Creek Investigation	TN & Associates, Inc., June 2001	Downstream sampling suggested that contaminants are migrating downstream from the NCRS/City of North Chicago discharge into Pettibone Creek.
2001	RI/RA Report - Site 17 – Pettibone Creek and Boat Basin	Tetra Tech, September 2003	Human health risks from exposure to surface water and surface sediment under recreational land use scenarios were less than USEPA and Illinois EPA acceptable risk management levels. It was recommended that a FS be prepared for Site 17 to identify possible remedial alternatives to address unacceptable risks to benthic invertebrates from sediment in the North Branch of Pettibone Creek and the Boat Basin.
March 2012	Sediment Characterization Report	Tetra Tech, July 2012	No Action was recommended as the alternative for Pettibone Creek because it was determined that risks to benthic invertebrates from chemicals in sediment are not considered great enough to warrant a remedial action. Also, a continuing source of upstream contamination exists, which is likely due to several non-point anthropogenic sources.

2.3 COMMUNITY PARTICIPATION

The **Proposed Plan for Site 17 – Pettibone Creek** (Tetra Tech, April 2013) was released for public review and comment by the Navy and Illinois EPA. In accordance with Sections 113 and 117 of CERCLA, a **public notice** was published informing the community that the Proposed Plan was available for review at the Environmental Department at NSGL. The public notice was published in the Great Lakes Bulletin on May 3, 2013 and local Pioneer Press newspapers for the North Chicago suburbs on May 2, 2013 including The Deerfield Review, The Highland Park News, The Lake Forester, The Libertyville Review, The Lincolnshire Review, The Mundelein Review, and The Vernon Hills Review. The public notice was also posted on the Illinois Public Notice website (http://publicnoticeillinois.com/) starting May 2, 2013. With the public notice, the Navy solicited comments on the Proposed Plan and provided the opportunity for interested parties to request a public meeting within a 30-day period beginning May 16, 2013 and ending June 17, 2013. No meeting requests or public comments were received.

The NSGL Information Repository, which contains the Administrative Record for Site 17, is available to the public at the Environmental Department at NSGL, Building 1A, located on 201 Decatur Avenue, Great Lakes, Illinois. Documents and other relevant information, including investigation activities, results, and associated remedial decisions relied on in the remedy selection process, are included in the Administrative Record. This ROD will become part of the Administrative Record File per NCP §300.825(a)(2). For access to the Administrative Record or additional information about the Installation Restoration Program at NSGL, contact Terese Van Donsel, Naval Facilities Engineering Command (NAVFAC) Midwest Remedial Project Manager, at (847) 688-2600, Extension 136. The Administrative Record can also be accessed online at: http://go.usa.gov/RsJ. From that web site, click on the "Administrative Records" tab, enter the Administrative Record, and search for "SITE 00017" documents.

2.4 SCOPE AND ROLE OF OPERABLE UNIT

Site 17 – Pettibone Creek (OU1) is part of a comprehensive environmental investigation and cleanup program currently being performed at NSGL. As part of the IAS, the Navy identified 14 potential areas where hazardous materials may have been released to the environment at NSGL (Rogers, Golden, & Halpern and BCM Eastern Inc., 1996). The identified sources of hazardous materials consisted of landfills and disposal areas, transformer storage areas, training areas, service stations, shooting ranges, and storage areas. Other potential Navy sources include surface runoff or fallout from engine exhaust from nearby roadways, historical application of pesticides, and VOCs stored in tanks and drums. Of these 14 areas of potential hazardous material releases, seven were recommended for further investigation and one was recommended for a cleanup action. Following the IAS, an additional 8 sites were identified for a total of 22 areas of potential hazardous material releases.

Site 17 is one of the 22 sites identified. This ROD is the final action for Site 17 – Pettibone Creek (OU1). A separate ROD will be issued at a later date to document the Navy's Selected Remedy for the OU2, the Boat Basin portion of Site 17. The other 21 identified sites are in various stages of being investigated and remediated. RODs have been signed for four of the sites.

2.5 SITE CHARACTERISTICS

2.5.1 Physical Characteristics

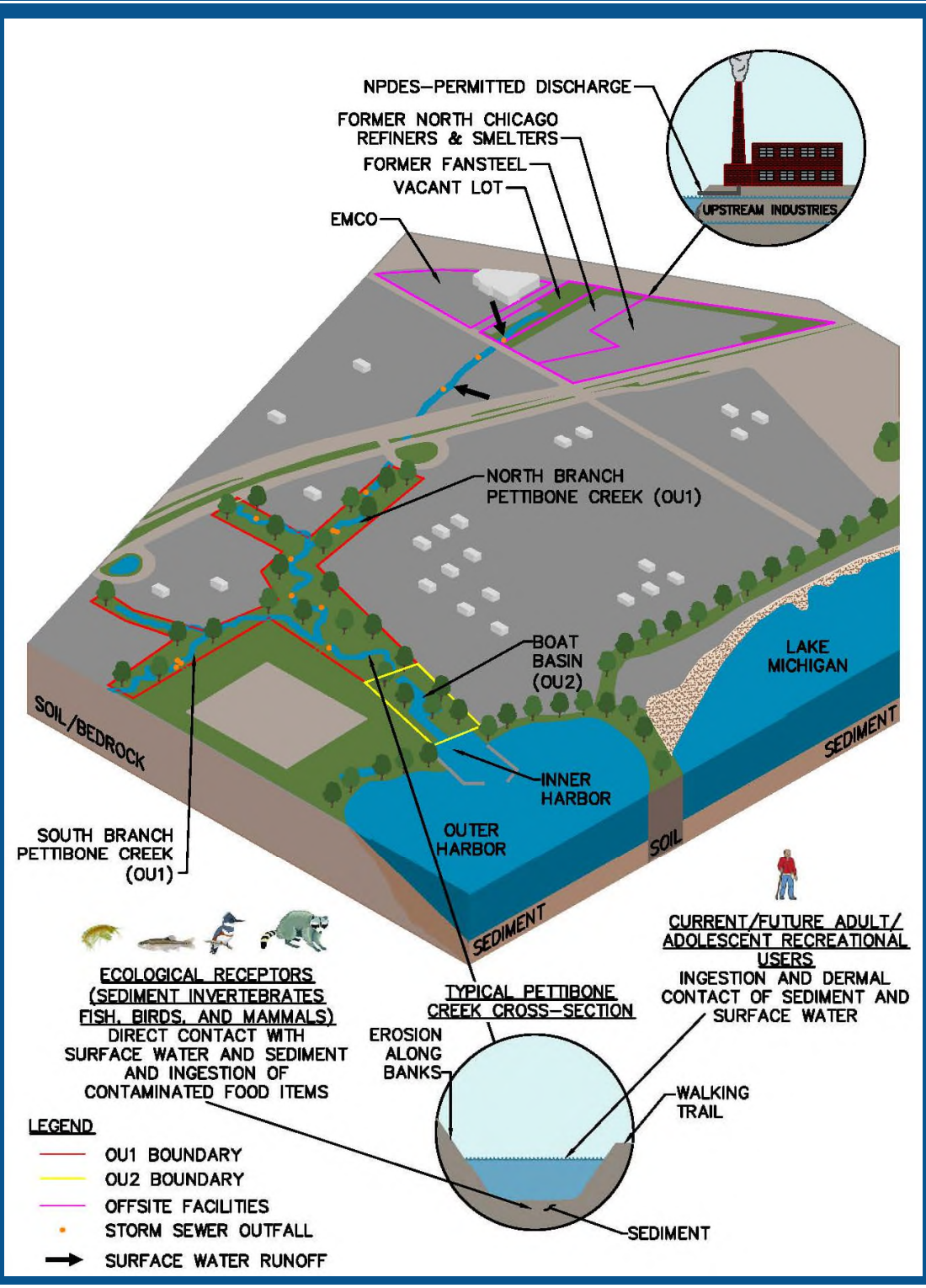
Pettibone Creek, including the North and South Branches, covers approximately 8,542,500 square feet, or 0.3 square mile. The creek ranges between 15 and 30 feet in width and several inches to 6 feet in depth, with an average flow of less than 10 cubic feet per second. Some low lying banks and small "flood plains" are found within the main banks of the creek. The creek sometimes floods its immediate low-lying banks within the main banks. The main banks are generally steep and 3 to 10 feet high. Flooding over top the higher banks is not known to have occurred. The urban nature of Pettibone Creek's watershed has resulted in flash floods and high channel velocities that caused severe erosion and sedimentation problems. Efforts to stabilize the erosion in the ravine have been made in the past. In 1982, NSGL initiated emergency slope stabilization. In 1989, after a period of major storms in 1987 and 1988, emergency pipe replacement and slope stabilization measures were conducted in three severely eroded areas.

2.5.2 Conceptual Site Model

Figure 2-2 presents the OU1 conceptual site model (CSM), which identifies contaminant sources, contaminant release mechanisms, transport routes, and receptors under current and future land use scenarios. The sources of contamination to Site 17 - Pettibone Creek include upstream industrial point sources (NPDES-permitted), urban runoff, and storm water from upstream outfalls as well as outfalls from NSGL storm sewers.

Based on current and potential future land use, adult and adolescent recreational users were considered potential receptors that may be exposed to surface water and sediment within the study area. A path along the North Branch is used by staff, military personnel and their family members to hike, jog, and walk

FIGURE 2-2. CONCEPTUAL SITE MODEL OF SITE 17 - PETTIBONE CREEK



their dogs. The South Branch flows at the base of steep slopes behind buildings and is not frequented by people.

Pettibone Creek is not used as a drinking water source. Fish are present intermittently in the creek and have been observed migrating upstream; however, it does not support a significant fish population. No federally listed endangered or threatened species are known to exist in the area.

Potential ecological receptors such as sediment invertebrates and fish can be exposed to contaminants in surface water and sediment of Pettibone Creek by direct contact with and incidental ingestion of surface water and sediment. Also, mammals and birds can be exposed to contaminants in surface water and sediment by direct contact with and incidental ingestion of these media and by ingestion of contaminated food items.

2.5.3 Nature and Extent of Contamination

Although no site-related contamination that requires remedial action was identified during investigations of OU1, the creek has been contaminated by a variety of upstream and NSGL-related sources as discussed below.

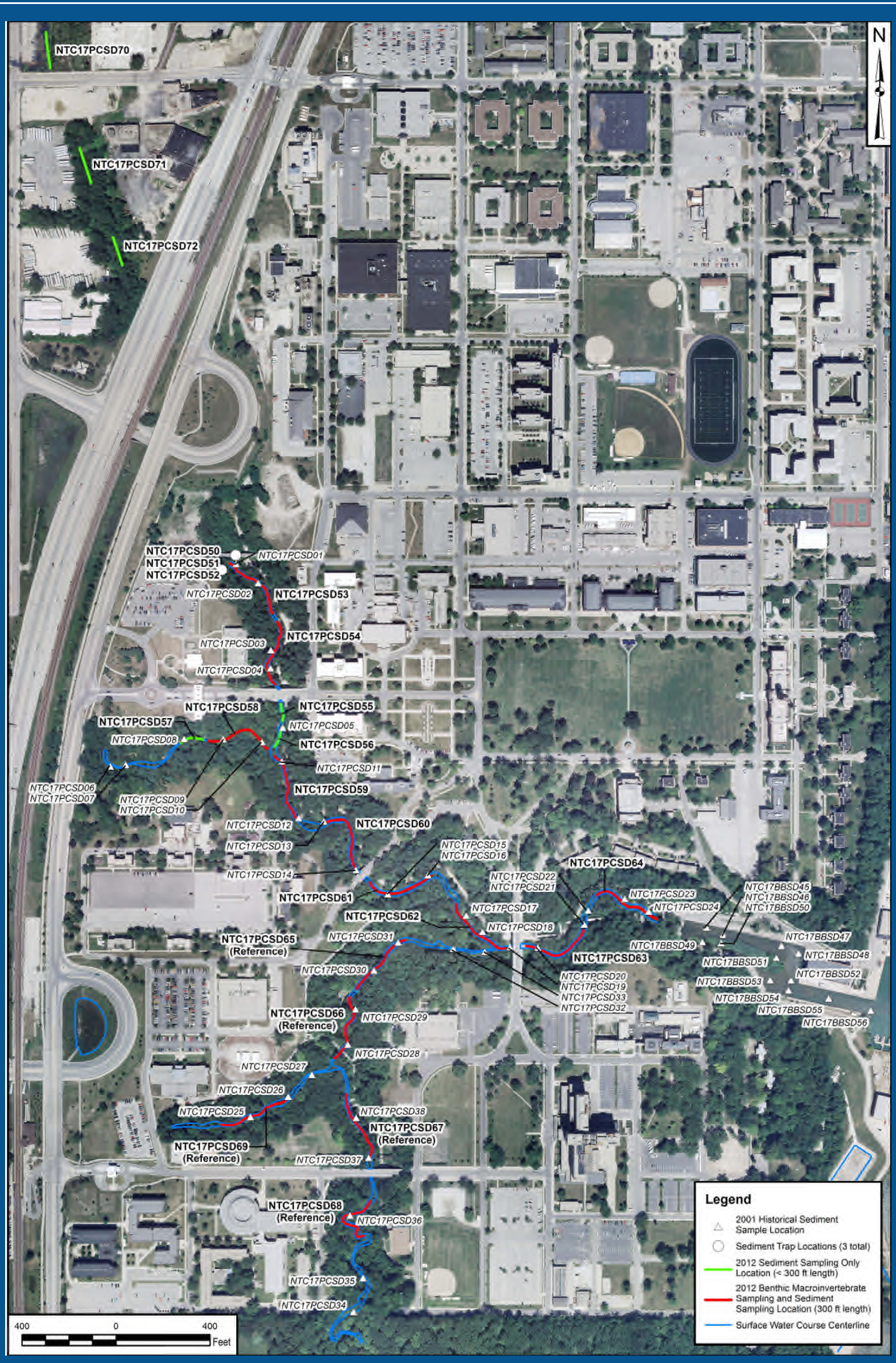
Pettibone Creek has received and may continue to receive discharges containing a variety of hazardous and petroleum substances from upstream industries, road runoff, storm sewers (from a large section of the City of North Chicago and 30 NSGL storm water outfalls), and runoff/discharges from local residential properties. Most of the contamination appears to originate near the headwaters of the North Branch of Pettibone Creek. The upstream areas adjacent to industrial sites have been remediated, and additional releases to the creek should not be as significant as in the past. Nevertheless, there could be residual runoff from these industrial sites into Pettibone Creek, and the upstream outfalls are still permitted under the state NPDES program (Tetra Tech, September 2003).

The following text summarizes the nature and extent of contamination in site media, as determined during the 2001 RI/RA (Tetra Tech, September 2003) and 2012 Sediment Characterization Report (Tetra Tech, July 2012) site investigations. Figure 2-3 shows sampling locations from 2001 and 2012.

The following summarizes the Pettibone Creek findings from the 2001 RI/RA (Tetra Tech, September 2003):

- VOCs were not significant site-related contaminants in sediment.
- PAHs were the predominant SVOCs detected in sediment samples, most likely the result of surface water runoff from roads, paved parking lots, roofs, and other places where petroleum-based materials are present.
- Pesticides were detected in the sediment samples at concentrations that reflected widespread and historical use of the chemicals for pest control.
- PCBs were detected in less than 50 percent of 2001 Pettibone Creek sediment samples and were only detected in 25 percent (5 of 20) of the 2012 sediment samples. The greatest concentration in the 2012 samples was found in an upstream (offsite) sample, and it was the only concentration that slightly exceeded the calculated baseline sediment cleanup objective for total PCBs. However, all the PCB concentrations in the 2012 samples were well below the **probable effects concentration (PEC)** based on toxicity to sediment-dwelling organisms. PCBs were detected in soil samples from Navy transformer storage areas. However, the source of PCBs is not known as PCBs were also detected in offsite upstream soil samples adjacent to the creek collected during previous environmental investigations and remedial actions that were conducted at the Vacant Lot site to address contamination.
- Several metals (copper, lead, mercury, selenium, silver, and zinc) were detected in sediment samples from the North Branch of Pettibone Creek at average concentrations an order of magnitude greater than background sediment and/or soil concentrations from the **Illinois EPA Tiered Approach to Corrective Action (TACO)**. In contrast, most metals concentrations in sediment samples from the South Branch of Pettibone Creek were similar to TACO background sediment and/or soil concentrations. These metals were also detected in offsite upstream samples collected during previous environmental investigations, often at concentrations two to three times greater than in Pettibone Creek sediment samples. It is believed that the vast majority of the metals concentrations detected in Pettibone Creek sediment are from historical upstream refining and smelting operations.

FIGURE 2-3. HISTORICAL SAMPLING LOCATIONS



The RI/RA (Tetra Tech, September 2003) recommended conducting an FS to evaluate remedial alternatives for both the Pettibone Creek and Boat Basin portions of Site 17. However, in accordance with Navy policy, contaminated sediments will not be remediated unless continuing sources of sediment contamination are eliminated. There were concerns that upstream sources of contamination had not been addressed and would recontaminate Pettibone Creek if an action was conducted to remove sediment within the NSGL portion of the creek. Therefore, to further characterize potential risks to benthic invertebrates, a Sediment Characterization Report (Tetra Tech, 2012) was prepared to evaluate March 2012 data collected in the North and South Branches of Pettibone Creek. The investigation included a **biological survey** to better determine site-specific potential risks to ecological receptors from exposure to creek sediment and evaluated the presence of upstream sources of contamination by sediment sampling.

The South Branch of Pettibone Creek was used as the reference area and was assumed to represent site conditions in the absence of upstream or site-related contamination; whereas, the North Branch of Pettibone Creek was considered to have been potentially impacted from upstream and NSGL sources for the Sediment Characterization Report (Tetra Tech, July 2012).

Chemical concentrations in sediment from samples upstream of NSGL indicated a continuing source of contaminants to sediment from upstream off-base (non-Navy) sources (see Figures 2-4 and 2-5). Elevated metals concentrations are likely reflective of the former manufacturing facilities in this area. It is not known whether concentrations in sediment represent historical discharges or whether there are current sources of metals still discharging to Pettibone Creek. However, the fact that elevated concentrations of metals were found in the upstream samples indicates that upstream sediment may be a continuing source of contamination to the downstream portion of Pettibone Creek. Current concentrations of metals in the downstream portion of Pettibone Creek have generally decreased from concentrations in 2001, suggesting that the source of metals contamination to the creek has likely decreased since that time.

Maximum concentrations of PAHs were detected in the sample located immediately downstream of a storm sewer discharging water/runoff from a large section of the City of North Chicago. Also, concentrations of PAHs in several of the 2012 samples were greater than or similar to results from 2001 samples. These results suggest that upstream sources are continuing to contribute to elevated concentrations of PAHs in Pettibone Creek.

Samples of sediment particles suspended in the water column were collected from sediment traps installed at the culvert pipes at the North Branch northern entry point onto NSGL property to determine whether contaminated sediment is entrained in Pettibone Creek surface water before it enters the NSGL property boundary. Each trap was constructed from a 4-inch polyvinyl chloride pipe and a filter bag, and was designed/installed in such a way as to collect and direct a portion of the stormwater discharge into the filter bag. The collected sediment had elevated concentrations of metals indicating that there are continuing sources of metals contamination to Pettibone Creek, upstream of where it enters the Navy property.

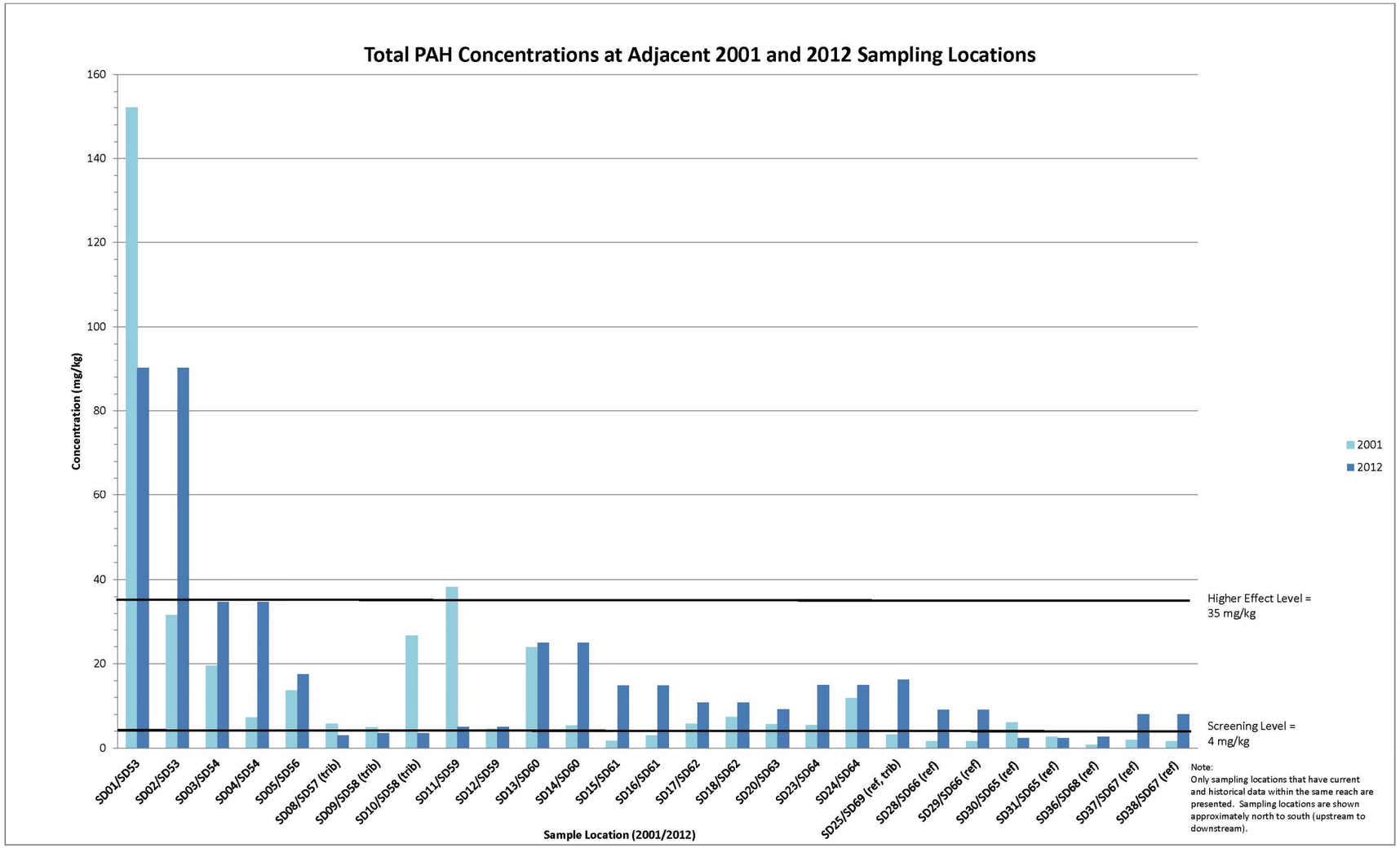
Based on elevated chemical concentrations, particularly metals and PAH concentrations, in upstream sediment samples and samples of sediment particles suspended in the water column, upstream sources are continuing to contribute to the chemical concentrations detected in Pettibone Creek within the NSGL property. The potential upstream continuing sources of metals and PAHs are likely a combination of point and non-point anthropogenic sources.

2.6 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

NSGL is an active Navy facility and is expected to remain active for the foreseeable future. OU1 is located on the Mainside of NSGL, east of the Recruit Training Command Area. NSGL is the only Navy recruit training facility; therefore, land use is unlikely to change.

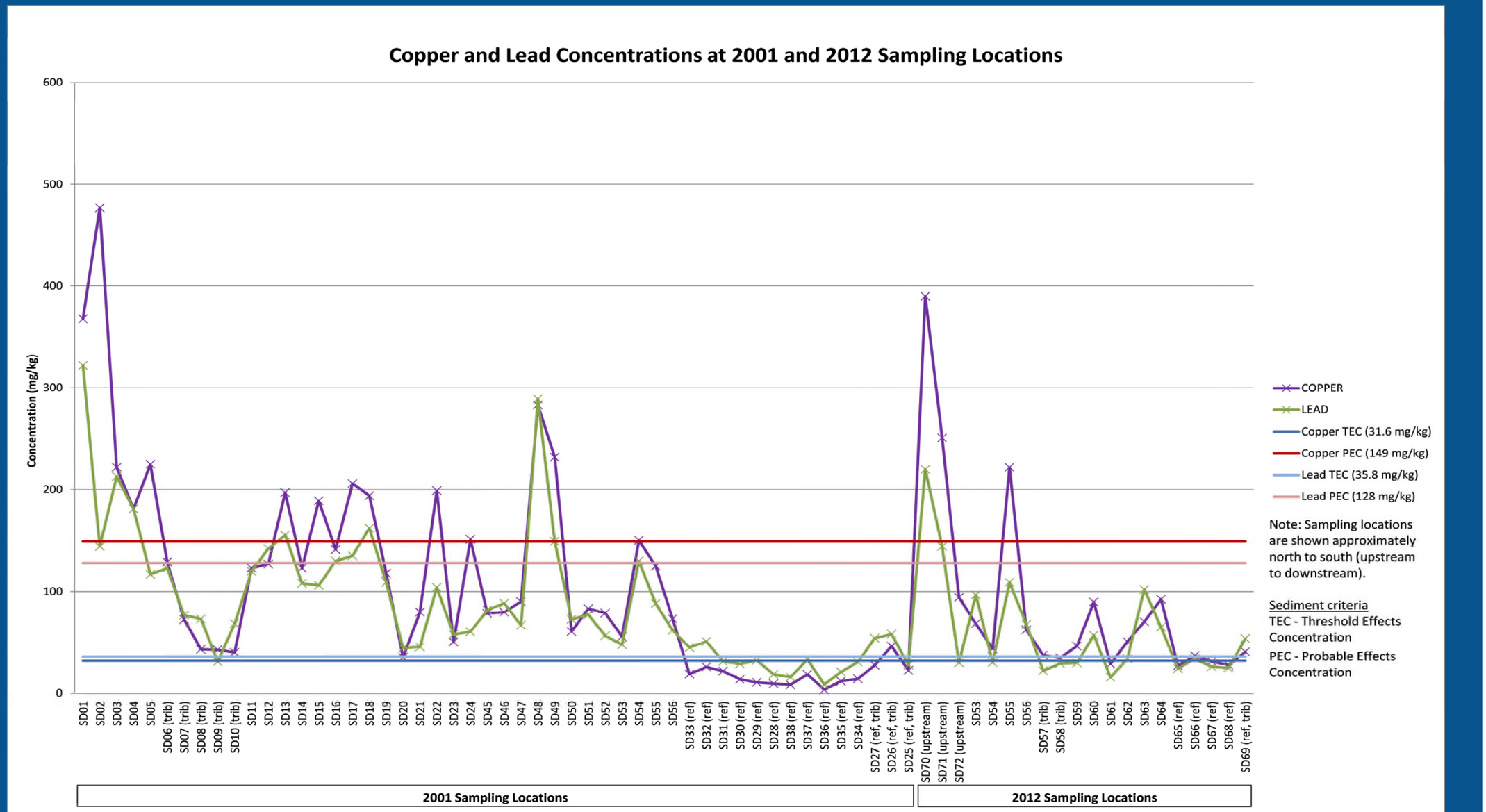
Site 17-Pettibone Creek (OU1) may be used for recreational purposes; however recreational users are not likely because a significant fish population is not available for fishing and recreational users on the

FIGURE 2-4. TOTAL PAH CONCENTRATIONS AT ADJACENT 2001 AND 2012 SAMPLING LOCATIONS



Adjacent sampling locations with current and historical total PAH data within the same reach are presented side by side to show the decrease in contaminant levels in a downstream direction and to illustrate that a continuing PAH sediment contaminant source is present.

FIGURE 2-5. COPPER AND LEAD CONCENTRATIONS AT 2001 AND 2012 SAMPLING LOCATIONS



Copper and lead concentrations have decreased from 2001 to 2012 and, both historically and currently, concentrations decrease from upstream to downstream in Pettibone Creek, indicating that the source is or was located upstream and off site.

path along the North Branch are not expected to enter the creek. It is possible though that recreational users may be exposed to surface water and sediment within the creek, on a limited basis.

Pettibone Creek provides habitat for ecological receptors. Potential ecological receptors such as benthic invertebrates and fish can be exposed to contaminants in the surface water and sediment of Pettibone Creek by direct contact and incidental ingestion of surface water and sediment. Also, mammals and birds can be exposed to contaminants in the surface water and sediment of Pettibone Creek by direct contact, ingestion of contaminated food items, and incidental ingestion of surface water and sediment.

Releases of contaminants from upstream industries, storm sewers, local residences, and road runoff currently and historically have impacted Pettibone Creek. Two of the industrial facilities (R. Lavin & Sons and Fansteel) that contributed to historical contamination in Pettibone Creek have recently been demolished, and currently, the land associated with these facilities is vacant and awaiting future commercial development by the City of North Chicago. Pettibone Creek may continue to receive a variety of contamination from upstream industries, road runoff, storm sewers, and runoff/discharges from local residential properties. Several of the potential sources (industrial sites) have been remediated, and it is expected that additional releases to the creek will not be as significant as in the past. Nevertheless, there could be residual runoff into Pettibone Creek, and upstream outfalls are still permitted under the state NPDES program.

2.7 SUMMARY OF SITE RISKS

The baseline RA estimates what risks the site poses if no action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action, if an action is required. Risks to human health and ecological receptors were evaluated and documented in the 2001 RI Report (Tetra Tech, September 2003). Risks to sediment invertebrates were also evaluated and documented in the 2012 Sediment Characterization Report (Tetra Tech, July 2012). Risks to human health and ecological receptors were evaluated to the North Branch and South Branch of Pettibone Creek separately within the 2001 RI. Only risks to the North Branch of Pettibone Creek are presented below as the South Branch of Pettibone Creek is not potentially impacted by off-site upstream industries or by NSGL operational activities.

2.7.1 Summary of Human Health Risk

The human health risk assessment (HHRA) completed for Site 17 – Pettibone Creek indicated no unacceptable human health risks from exposure to surface water or sediment. The approaches taken to make these determinations were extremely conservative. A brief discussion of the HHRA findings is presented below, details are provided in the RI/RA report (Tetra Tech, September 2003).

The major components of an HHRA include data evaluation, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis. Data evaluation is a task that uses a variety of information to determine which of the chemicals detected in site media are most likely to present a risk to potential receptors. The end result of the evaluation is a list of chemicals of potential concern (COPCs) and representative exposure point concentrations (EPCs) for each medium. During the exposure assessment, potential human exposure pathways are identified at the areas under consideration. Chemical-specific toxicity criteria for the identified COPCs are identified during the toxicity assessment and are used in the quantification of potential human health risks. Risk characterization involves quantifying the risks associated with exposure to the COPCs using algorithms established by USEPA. Risks from chemicals are calculated for both carcinogenic and non-carcinogenic effects. The uncertainty analysis identifies limitations in the HHRA that might affect the final risk results. The final result of the HHRA if unacceptable risks are identified is the identification of medium-specific chemicals of concern (COCs) and exposure pathways that need to be addressed by a remedial action. Tables summarizing data used in the HHRA, and associated HHRA results are presented in Appendix A.

Identification of COPCs

Validated data collected during the 2001 RI were used to identify COPCs for the site. USEPA Region 9 Preliminary Remediation Goals (PRGs) and Illinois EPA Tier 1 Soil Remediation Objectives for Residential Properties for the Soil Ingestion Exposure Route were used to **select COPCs** in sediment. Illinois EPA and USEPA drinking water criteria and ambient water quality criteria were used to select COPCs in surface water.

Tables 3.1, 3.2, and 3.5 in Appendix A present EPCs for the COPCs identified in sediment and surface water. EPCs are the concentrations used in the HHRA to estimate exposure and risk from each COPC. Maximum detected concentrations or 95-percent upper confidence limits on the mean (calculated using various statistical methods) were used as the EPCs.

Exposure Assessment

During the exposure assessment, current and potential future exposure pathways through which humans might come into contact with the COPCs identified in the previous step were evaluated. In the HHRA, adult and adolescent recreational users were evaluated as potential receptors for current and future exposure to surface water and sediment and were assumed to be exposed primarily via dermal contact and incidental ingestion. These receptors have been identified by analyzing current land use practices, potential future land use, and the identified areas of contamination in order to focus the risk assessment on potential site related exposures. Exposure via inhalation is expected to be minimal and was not quantitatively evaluated in the HHRA. Although some fish may be present in the North Branch of Pettibone Creek, it does not support a significant fish population; therefore, the HHRA did not evaluate ingestion of fish as a potential exposure pathway.

Toxicity Assessment

Toxicity assessment involves identifying the types of adverse health effects caused by exposure to site COPCs and determining the relationship between the magnitude of exposure and the severity of adverse effects (i.e., dose-response relationship) for each COPC. Quantitative toxicity values [oral cancer slope factors (CSFs) and oral reference doses (RfDs)] determined during this component of the HHRA were integrated with outputs of the exposure assessment to characterize the potential for adverse health effects for each receptor group.

Table 5-1 in Appendix A provides non-carcinogenic hazard information relevant to the COPCs for oral/dermal exposure. Table 6-1 in Appendix A provides carcinogenic risk information relevant to the COPCs for oral/dermal exposure.

Risk Characterization

During the **risk characterization**, the outputs of the exposure and toxicity assessments are combined to characterize the baseline risk (cancer risks and non-cancer hazards) at the site if no action was taken to address the contamination. Potential cancer risks and non-cancer hazards were calculated based on reasonable maximum exposure (RME) and central tendency exposure (CTE) assumptions. The RME scenario assumes the maximum level of human exposure that could reasonably be expected to occur, and the CTE scenario assumes a median or average level of human exposure. No unacceptable human health risks were determined for receptors potentially exposed to surface water and sediment within OU1.

The calculation of potential cancer risks and non-cancer hazards and their respective results are discussed below.

Cancer risk is calculated from the following equation:

$$\text{Risk} = \text{CDI} \times \text{CSF}$$

where: Risk = a unitless probability (e.g., 2 x 10^{-5}) of an individual developing cancer
CDI = chronic daily intake averaged over 24 years for the RME scenario for an adult, 7 years for the CTE scenario for an adult, or 10 years for the RME and CTE scenario for an adolescent (in mg/kg-day)
CSF = slope factor (in mg/kg-day^{-1})

Tables 8.1 through 8.4 (sediment) and Tables 8.7 through 8.8 (surface water) in Appendix A summarize RME and CTE cancer risk estimates for the human receptors and routes of exposure evaluated, developed by taking into account various conservative assumptions about the frequency and duration of exposure for each receptor. For known or suspected carcinogens, USEPA acceptable additional cancer risk falls within a range between 1 person in 10,000 (1 x 10^{-4}) and 1 person in 1 million (1 x 10^{-6}), known as the risk management range. Risks less than 1 in 1 million (that is, less than 1 x 10^{-6}) are considered to be acceptable. Risks greater than 1 in 10,000 (that is, greater than 1 x 10^{-4}) are typically considered unacceptable and require remedial action. The cancer risk for adult (6.9 x 10^{-6}) and adolescent (2.6 x 10^{-6}) recreational users from exposure to sediment in the North Branch of Pettibone Creek was within the USEPA risk management range. Risks greater than 1.0 x 10^{-6} were mainly the result of exposure to PAHs. The cancer risks for adult and adolescent recreational users from exposure to surface water in the North Branch of Pettibone Creek were less than 1.0 x 10^{-6}.

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., a lifetime) to an RfD derived for a similar exposure period. An RfD represents a level to which an individual may be exposed that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ of 1 or less indicates that the dose of a single contaminant is unlikely to result in toxic non-carcinogenic effects from that chemical. The hazard index (HI) is generated by adding the HQs for all chemicals that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may be reasonably exposed. An HI less than 1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic non-carcinogenic effects from all contaminants are unlikely. An HI greater than 1 indicates that site-related exposures may present a risk to human health.

The HQ is calculated as follows:

Non-cancer HQ = CDI / RfD

where: HQ = hazard quotient
CDI = chronic daily intake (mg/kg-day)
RfD = reference dose (mg/kg-day)

Tables 7.1 through 7.4 (sediment) and Tables 7.7 through 7.8 (surface water) in Appendix A provide RME and CTE non-cancer risk estimates for each receptor and route of exposure. The HIs for adult and adolescent recreational users exposed to creek surface sediment and surface water in the North Branch of Pettibone Creek were less than 1.0, indicating that humans should not experience non-cancer risks.

No major sources of uncertainty, other than those typically associated with HHRA estimates, were identified for the HHRA. Based on the results of the HHRA, no unacceptable cancer risks or non-cancer hazards were identified for current or potential future human receptors. Because exposure to the levels of chemicals in OU1 surface water and sediment were not associated with any unacceptable human health risks, no OU1 human health COCs were identified.

2.7.2 Summary of Ecological Risk

Potential ecological risks for benthic invertebrates, fish, piscivorous (fish-eating) birds, and carnivorous mammals exposed to chemicals in surface water and sediment were initially evaluated in the ecological risk assessment (ERA) conducted as part of the 2001 RI (Tetra Tech, September 2003). Exposure pathways for ecological receptors included direct contact with and incidental ingestion of contaminated sediment and surface water and ingestion of contaminated food items. The ERA consisted of Steps 1, 2, and 3a of the eight steps required by the USEPA guidance and the Navy Policy for Conducting Ecological

Risk Assessments. The first two steps are the screening-level ERA. Step 3a is the first step of the baseline ERA and further refines the list of COPCs that were retained from the screening-level ERA and determines if Steps 3b through 7 of the baseline ERA are necessary. Finally, Step 8, Risk Management, is incorporated throughout the ERA process, in cooperation with the Illinois EPA. In Steps 1 and 2, potential risks to benthic invertebrates and fish resulting from exposure to chemicals were initially evaluated by comparing chemical concentrations to **ecological screening levels**. Risks to a representative piscivorous bird (belted kingfisher) and carnivorous mammal (raccoon) from exposure to chemicals in sediment and surface water were determined using food-chain models to estimate the CDI and compare the CDI to toxicity reference values representing acceptable daily does in mg/kg-day. Several chemicals were initially selected as **ecological COPCs** because they were detected at concentrations that exceeded their respective screening levels. Based on the **Step 3a evaluation**, several PAHs, pesticides, and metals were retained as COCs for risks to benthic invertebrates in North Branch of Pettibone Creek sediment. Most of the elevated concentrations of these chemicals were found in the furthest upstream sample, which indicates that the predominant source of these chemicals is not within NSGL. Some of the pesticides detected, such as DDT, are now banned; however, these pesticides may have been historically used at NSGL when it was legal to do so. The ERA also found that there was a potential risk to piscivorous birds from two pesticides (4,4'-DDE and 4,4'-DDT) based on a model of contaminant uptake through the food chain. However, the concentrations of pesticides are indicative of concentrations associated with typical applications of the pesticides; therefore, they did not appear to be related to site activities.

As part of the investigation associated with the Sediment Characterization Report (Tetra Tech, July 2012) completed in 2012, a sediment triad approach that evaluated **three lines of evidence** (benthic community survey, sediment chemistry concentrations, and toxicity testing) regarding the health of benthic invertebrates in sediment was used to determine if the benthic community was being impacted in Pettibone Creek and whether impacts were related to contaminants in the sediment. During the investigation, composite sediment samples were collected for chemical analysis and toxicity testing, and benthic community health data were collected to directly determine whether benthic invertebrates are being adversely impacted from exposure to North Branch Pettibone Creek sediment. As part of the benthic invertebrate community survey, benthic invertebrates were collected from 14 areas within the creek to adequately characterize the benthic community present within Pettibone Creek. Nine of the areas were located along the North Branch of Pettibone Creek, and five of the areas were located along the South Branch of Pettibone Creek, which is not significantly contaminated and is considered a reference location. Potential risks to piscivorous birds were not evaluated in the site investigations for the Sediment Characterization Report because, as discussed in the RI, the pesticides did not appear to be site related. In addition, total DDT concentrations in sediment were much lower in the 2012 samples, so estimated risks would have decreased to acceptable levels.

The first line of evidence, the benthic community survey, found that the benthic community in Pettibone Creek ranged from poor to fair, with the benthic community in the South Branch generally better based on several indicators of health than those in the North Branch. A summary of indicators used to determine benthic community health is presented in Table 2-2. A strong correlation between benthic community health and physical stressors related to habitat conditions suggested that almost 50 percent of the variability in the biological index [Macroinvertebrate Index of Biotic Integrity (mIBI)] can be attributed to habitat. Habitat stressors within Pettibone Creek include the extent of in-stream cover, channel morphology, and water velocity during high-flow events.

TABLE 2-2. SUMMARY OF BENTHIC COMMUNITY RESULTS

Station ID	mIBI		Total Taxa	EPT % Score	Scraper % Score	MBI score	Density	QHEI	
	Score	Rating						Score	Rating
Reference Samples									
NTC17PCSD65	21.3	Fair	21	4.83	25.34	42.22	3980	62.5	Good
NTC17PCSD66	24.1	Fair	29	4.67	23.37	46.59	2565	58.5	Good
NTC17PCSD67	30.3	Fair	31	4.9	35.42	51.35	2741	55.5	Good
NTC17PCSD68	30.5	Fair	30	1.01	36.56	68.19	4388	66	Good

TABLE 2-2. SUMMARY OF BENTHIC COMMUNITY RESULTS

Station ID	mIBI		Total Taxa	EPT % Score	Scraper % Score	MBI score	Density	QHEI	
	Score	Rating						Score	Rating
NTC17PCSD69	13.3	Poor	17	4.1	11.52	40.58	2756	52	Fair
Site Samples									
NTC17PCSD53	14*	Poor	21	0	2.26	38.92	1806	54	Fair
NTC17PCSD54	19.4	Poor	22	0.49	4.91	51.22	2085	49.5	Fair
NTC17PCSD58	10.4*	Poor	13	0	1.1	32.24	1389	49.5	Fair
NTC17PCSD59	12.6*	Poor	20	2.36	3.54	38.81	2419	49.5	Fair
NTC17PCSD60	17.2*	Poor	25	7.36	3.94	54.98	837	59.5	Good
NTC17PCSD61	21.3	Fair	25	4.5	5.01	74.33	984	61	Good
NTC17PCSD62	20.8	Poor	28	0.52	11.61	41.48	1157	56.5	Good
NTC17PCSD63	23.5	Fair	30	0.9	14.59	41.33	2595	61	Good
NTC17PCSD64	20.2	Poor	24	2.81	11.69	32.37	5569	56.5	Good

* - Sample has a statistically lower mIBI score as compared to the lowest reference sample mIBI, not including the reference tributary.
mIBI - Macroinvertebrate Index of Biotic Integrity
EPT - Ephemeroptera, Plecoptera, and Trichoptera
MBI - Modified Biotic Index
QHEI - Qualitative Habitat Evaluation Index

The next line of evidence was sediment chemistry. Several chemicals were detected at concentrations that exceeded their respective ecological sediment criteria. However, the results of the last line of evidence, toxicity testing, found that none of the site samples were considered impacted regarding the survival or growth of *Hyalella azteca* (scud), which was selected because it is a sensitive freshwater benthic invertebrate commonly used for toxicity testing.

Table 2-3 presents a summary of the three lines of evidence. In general, the greatest concentrations of select metals and PAHs in sediment with low mIBI values were from locations NTC17PCSD53 and NTC17PCSD60 (Figure 2-3). NTC17PCSD53 is the farthest upstream location on NSGL property. Based on the results of the three lines of evidence from the 2012 investigation (chemistry, toxicity testing, and benthic community survey data), the possibility that chemicals in sediment are at least partially impacting the benthic community in Pettibone Creek could not be ruled out. However, the lack of toxicity observed in the toxicity test supports the likelihood that the poor to fair benthic community in the creek is related to habitat conditions. This is further supported by the fact that no strong relationships were found between chemical concentrations and the benthic community using toxicity test results. Therefore, it is believed that the benthic community is affected more by habitat stressors than by sediment contamination and so any actions to address chemical concentrations in the sediment may not result in an improved benthic community. For that reason, it was determined that risks to benthic macroinvertebrates from chemicals in sediment are not considered great enough to warrant a remedial action. In addition, because of the existing physical site characteristics of the site, a removal action such as dredging the sediment would likely further negatively impact creek bed habitat, as well as the ravine sides, which are severely sloped and under continual erosive forces.

TABLE 2-3. COMPARISON OF BENTHIC COMMUNITY INDICATORS, SEDIMENT CHEMISTRY CONCENTRATIONS, AND TOXICITY TESTING RESULTS

Station ID	Benthic Community Indicators		Sediment Chemistry Concentrations (mg/kg)				Toxicity Test Results	
	MIBI Index Rating	QHEI Rating	Copper	Lead	Zinc	PAHs	Percent Survival	Growth
Reference Samples								
NTC17PCSD65	Fair	Good	26.6	24	91.8	2.4	NA	NA
NTC17PCSD66	Fair	Good	36.8	33.8	144	9.1	95	0.15
NTC17PCSD67	Fair	Good	31	25.8	104	8.1	NA	NA
NTC17PCSD68	Fair	Good	27.4	24.6	96	2.8	87.5	0.1088
NTC17PCSD69	Poor	Fair	40.6	53.6	146	16.2	NA	NA
Site Samples								
NTC17PCSD53	Poor	Fair	68.3	96.7	384	90.2	88.8	0.1025
NTC17PCSD54	Poor	Fair	43.5	30	131	34.7	92.5	0.1175
NTC17PCSD58	Poor	Fair	34.7	29	107	3.5	NA	NA
NTC17PCSD59	Poor	Fair	46.2	29.6	141	5	NA	NA
NTC17PCSD60	Poor	Good	89.6	56.8	329	25	86.3	0.0912
NTC17PCSD61	Fair	Good	28.5	15.4	85.5	14.9	93.8	0.0875
NTC17PCSD62	Poor	Good	50.6	33.7	56.7	10.8	NA	NA
NTC17PCSD63	Fair	Good	70.3	102	299	9.2	93.8	0.12
NTC17PCSD64	Poor	Good	92.3	64.8	357	15	82.5	0.0825

mIBI - Macroinvertebrate Index of Biotic Integrity QHEI - Qualitative Habitat Evaluation Index
NA - Not applicable

2.7.3 Basis for No Action Determination

Based on the findings of the RI/RA conducted in 2001 (Tetra Tech, September 2003) and the Sediment Characterization Report (Tetra Tech, July 2012), No Action is recommended for OU1. The HHRA conducted for OU1, which evaluated adolescent and adult recreational users exposed to surface water and sediment indicated no unacceptable risk. The ecological evaluations conducted for OU1, which evaluated benthic invertebrates, fish, piscivorous (fish-eating) birds, and carnivorous mammals indicated no unacceptable risk. The HHRA and ERA are protective of current and future land use as OU1 is located within NSGL, which is an active Navy facility and is expected to remain active for the foreseeable future. Based on these evaluations, no action for OU1 is necessary to protect the public health or welfare or the environment. Because no action is being taken, no change in the current condition of the creek, and no change in current risks to receptors exposed to sediment in the creek will occur.

2.8 DOCUMENTATION OF SIGNIFICANT CHANGES

CERCLA Section 117(b) requires an explanation of significant changes from the Selected Remedy presented in the Proposed Plan published for public comment. Although the opportunity for a public meeting was provided as stated in the Navy's public notice, none was requested, and no written comments, concerns, or questions were received by the Navy or Illinois EPA during the public comment period.

3.0 RESPONSIVENESS SUMMARY

The Navy released the Proposed Plan for OU1, Site 17- Pettibone Creek for public comment. The Navy did not receive a request for a public meeting and no comments or questions were received during the designated public comment period.

LIST OF ACRONYMS AND ABBREVIATIONS

CDI	Chronic Daily Intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Chemical of Concern
COPC	Chemical of Potential Concern
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
CTE	Central Tendency Exposure
EPC	Exposure Point Concentration
EPT	Ephemeroptera, Plecoptera, Trichoptera
ERA	Environmental Risk Assessment
ER, N	Environmental Restoration, Navy
FS	Feasibility Study
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
IAS	Initial Assessment Study
Illinois EPA	Illinois Environmental Protection Agency
MBI	Modified Biotic Index
mIBI	Macroinvertebrate Index of Biotic Integrity
NA	Not Applicable
NAVFAC	Naval Facilities Engineering Command
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NCRS	North Chicago Refiners and Smelters
NFA	No Further Action
NPDES	National Pollutant Discharge Elimination System
NSGL	Naval Station Great Lakes
OU	Operable Unit
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PEC	Probable Effects Concentration
PRG	Preliminary Remediation Goal
QHEI	Qualitative Habitat Evaluation Index
RA	Risk Assessment
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SVOC	Semivolatile Organic Compound
TACO	Tiered Approach to Corrective Action Objectives
TCE	Trichloroethene
TEC	Threshold Effects Concentration
USC	United States Code
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

REFERENCES

Ecology & Environment, Inc., October 1997. Engineering Evaluation/Cost Analysis for the Vacant Lot.

Halliburton NUS, June 1993. Site Inspection Report for Pettibone Creek, Boat Basin and Harbor Areas Naval Training Center Great Lakes, Illinois.

Illinois Department of Public Health, June 1995. Health Assessment State Initial Site Evaluation, North Chicago Refiners and Smelters, North Chicago, Lake County, Illinois. CERCLA Number ILD097271563.

Illinois EPA (Illinois Environmental Protection Agency), June 1990. Water Quality Study of Pettibone Creek.

Illinois EPA, December 1991. NCRS Preliminary Facility Investigation.

Illinois EPA, February 1992. CERCLA Screening Site Inspection Analytical Results.

Illinois EPA, August 1994. A Summary of Selected Background Conditions for Inorganic in Soil.

Illinois EPA, December 1995. CERCLA Expanded Site Inspection Report.

OHM Remediation Services Corp., October 1999. Final Report Removal of Lead and PCB Contaminated Soil at the Vacant Lot Site, North Chicago, Illinois. Contract No. DACW45-94-D-0005, Delivery Order No. 55. For the United States Army Corps of Engineers.

Rogers, Golden, & Halpern and BCM Eastern Inc., March 1996. Initial Assessment Study, Naval Complex Great Lakes, Illinois.

Tetra Tech, Inc., September 2003. Remedial Investigation and Risk Assessment Report - Site 17 – Pettibone Creek and Boat Basin, Naval Training Center Great Lakes, Great Lakes Illinois.

Tetra Tech, Inc., July 2012. Sediment Characterization Report in Support of the Feasibility Study for Site 17 – Pettibone Creek, Naval Station Great Lakes, Great Lakes, Illinois.

Tetra Tech, Inc., April 2013. Proposed Plan for Site 17 – Pettibone Creek (Operable Unit 1), Naval Station Great Lakes, Installation Restoration Program, Great Lakes, Illinois.

TN&A (TN & Associates, Inc.), June 2001. Letter Report Pettibone Creek Investigation North Chicago, Lake County, Illinois.

USEPA Region 5, May 1980. Report on an Investigation of Sediment Contamination.

USEPA, April 2002a. Fansteel Briefing, Fansteel, Inc. Site, One Tantalum Place, North Chicago, Lake County, Illinois. Operable Unit 01 - Site Spill ID# B5H7, Vulcan Louisville Smelting Company (a.k.a. “The Vacant Lot Site”), CERCLIS ID # ILD097271563. By John O’Grady, USEPA Region 5.

USEPA, April 2002b. R. Lavin Briefing, R. Lavin & Sons, Inc. (a.k.a. North Chicago Refiners & Smelters), North Chicago, Lake County, Illinois 60064. By John O’Grady, USEPA Region 5.

USEPA, May 2002. Vacant Lot Briefing, Vulcan Louisville Smelting Company (aka The Vacant Lot), North Chicago, Lake County, Illinois. CERCLIS ID # ILD-097-271-563; Site Spill ID# A527. By John O’Grady, USEPA Region 5.

SITE 17 – PETTIBONE CREEK (OPERABLE UNIT 1) NAVAL STATION GREAT LAKES, ILLINOIS

DETAILED ADMINISTRATIVE RECORD REFERENCE TABLE

ITEM	REFERENCE PHRASE IN ROD	LOCATION IN ROD	LOCATION OF INFORMATION IN ADMINISTRATIVE RECORD
1	Sediment Characterization Report in Support of the Feasibility Study (FS) for Site 17-Pettibone Creek	Section 1.3 Page 2	Tetra Tech, July 2012. Sediment Characterization Report in Support of the Feasibility Study for Site 17-Pettibone Creek.
2	Remedial Investigation	Section 2.1 Page 3	Tetra Tech, September 2003. Remedial Investigation and Risk Assessment Report, Site 17 – Pettibone Creek and Boat Basin.
3	Initial Assessment Study	Section 2.2 Page 5	Rogers, Golden & Halpern, March 1986. Initial Assessment Study, Naval Complex Great Lakes, Illinois.
4	human health risks	Section 2.2 Page 5	Tetra Tech, September 2003. Section 6.0.
5	ecological risks	Section 2.2 Page 5	Tetra Tech, September 2003. Section 7.0.
6	Proposed Plan	Section 2.2 Page 5	Navy, 2008. Proposed Plan For Pettibone Creek and Boat Basin, NTC Great Lakes, Illinois.
7	Report on an Investigation of Sediment Contamination	Table 2-1 Page 6	USEPA Region 5, May 1980. Investigation of Sediment Contamination Waukegan River and Pettibone Creek, NTC Great Lakes, Illinois.
8	Site Inspection Report for Pettibone Creek, Boat Basin and Harbor	Table 2-1 Page 6	Halliburton NUS, June 1993. Draft Site Inspection Report Pettibone Creek And Boat Basin And Harbor Areas, NTC Great Lakes, Illinois.
9	A Summary of Selected Background Conditions for Inorganics in Soil study	Table 2-1 Page 6	Illinois EPA, 1994. A Summary of Selected Background Conditions of Inorganics in Soil. IEPA/ENV/94-161.
10	Proposed Plan for Site 17 – Pettibone Creek	Section 2.3 Page 7	Tetra Tech, April 2013. Proposed Plan for Site 17 – Pettibone Creek (Operable Unit 1).

DETAILED ADMINISTRATIVE RECORD REFERENCE TABLE

ITEM	REFERENCE PHRASE IN ROD	LOCATION IN ROD	LOCATION OF INFORMATION IN ADMINISTRATIVE RECORD
11	public notice	Section 2.3 Page 7	Pioneer Press (Sun Times), May 2013. Public Notice Regarding Public Comment Period Site 17 – Pettibone Creek (Operable Unit 1). Lake County Journal (Great Lakes Bulletin), May 2013. Public Notice Regarding Public Comment Period Site 17 – Pettibone Creek (Operable Unit 1).
12	probable effects concentration (PEC)	Section 2.5.3 Page 10	Tetra Tech, July 2012. Section 3.1.2.
13	Illinois EPA Tiered Approach to Corrective Action (TACO)	Section 2.5.3 Page 10	Tetra Tech, September 2003. Section 4.3.2.
14	biological survey	Section 2.5.3 Page 12	Tetra Tech, July 2012. Appendix B.
15	select COPCs	Section 2.7.1 Page 16	Tetra Tech, September 2003. Section 6.1.2.
16	risk characterization	Section 2.7.1 Page 16	Tetra Tech, September 2003. Section 6.4.
17	ecological screening levels	Section 2.7.2 Page 18	Tetra Tech, September 2003. Section 7.2.
18	ecological COPCs	Section 2.7.2 Page 18	Tetra Tech, September 2003. Section 7.5.
19	Step 3a evaluation	Section 2.7.2 Page 18	Tetra Tech, September 2003. Section 7.6.
20	three lines of evidence	Section 2.7.2 Page 18	Tetra Tech, July 2012. Section 3.0.

Appendix A
Human Health Risk Tables

TABLE 3.1
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 17 - North Branch Pettibone Creek

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)anthracene	mg/kg	1.30E+00	2.07E+00	1.10E+01		mg/kg	1.86E+00	95%UCL-L	1
Benzo(a)pyrene	mg/kg	1.29E+00	2.06E+00	1.10E+01		mg/kg	1.87E+00	95%UCL-L	1
Benzo(b)fluoranthene	mg/kg	1.36E+00	2.19E+00	1.20E+01		mg/kg	1.95E+00	95%UCL-L	1
Benzo(k)fluoranthene	mg/kg	7.40E-01	1.18E+00	6.30E+00		mg/kg	1.07E+00	95%UCL-L	1
Indeno(1,2,3-cd)pyrene	mg/kg	6.58E-01	1.06E+00	5.80E+00	J	mg/kg	9.55E-01	95%UCL-L	1
4,4'-DDT	mg/kg	1.74E-01	2.98E-01	1.80E+00		mg/kg	4.40E-01	95%UCL-L	1
Aroclor-1254	mg/kg	1.20E-01	1.64E-01	4.40E-01		mg/kg	2.57E-01	95%UCL-L	1
Arsenic	mg/kg	5.84E+00	6.40E+00	1.04E+01		mg/kg	6.40E+00	95%UCL-L	1
Cadmium	mg/kg	7.32E-01	1.10E+00	4.20E+00		mg/kg	1.76E+00	95%UCL-L	1
Chromium	mg/kg	1.65E+01	1.99E+01	5.58E+01	J	mg/kg	1.92E+01	95%UCL-L	1
Copper	mg/kg	1.56E+02	1.92E+02	4.77E+02		mg/kg	2.20E+02	95%UCL-L	1
Mercury	mg/kg	3.90E-01	7.20E-01	4.70E+00		mg/kg	5.38E-01	95%UCL-L	1
Thallium	mg/kg	8.17E-01	1.01E+00	2.10E+00	J	mg/kg	1.12E+00	95%UCL-L	1

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-L);
UCL = Upper Confidence Level
EPC = Exposure Point Concentration
J = Estimated Concentration

Potential Rationale

(1) Shapiro-Wilk W Test indicates data are log-normally distributed
(2) Shapiro-Wilk W Test indicates data are normally distributed
(3) Shapiro-Wilk W Test is inconclusive. Therefore, data are assumed to be lognormally distributed.
(4) The 95% UCL exceeded the maximum; therefore the maximum was used.
(5) There were less than 10 samples taken. Therefore, the maximum detected concentration was used.

TABLE 3.2
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SEDIMENT
SITE 17 - SOUTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 17 - South Branch Pettibone Creek

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)anthracene	mg/kg	3.60E-01	6.96E-01	2.80E+00		mg/kg	5.70E-01	95%UCL-L	1
Benzo(a)pyrene	mg/kg	3.27E-01	5.75E-01	2.10E+00	J	mg/kg	5.38E-01	95%UCL-L	1
Benzo(b)fluoranthene	mg/kg	3.24E-01	5.84E-01	2.20E+00		mg/kg	5.22E-01	95%UCL-L	1
Indeno(1,2,3-cd)pyrene	mg/kg	1.60E-01	2.61E-01	8.80E-01	J	mg/kg	2.50E-01	95%UCL-L	1
Thallium	mg/kg	7.29E-01	9.35E-01	1.50E+00		mg/kg	1.05E+00	95%UCL-L	1

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-L);
UCL = Upper Confidence Level
EPC = Exposure Point Concentration
J = Estimated Concentration

Potential Rationale

(1) Shapiro-Wilk W Test indicates data are log-normally distributed
(2) Shapiro-Wilk W Test indicates data are normally distributed
(3) Shapiro-Wilk W Test is inconclusive. Therefore, data are assumed to be lognormally distributed.
(4) The 95% UCL exceeded the maximum; therefore the maximum was used.
(5) There were less than 10 samples taken. Therefore, the maximum detected concentration was used.

TABLE 3.5
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SURFACE WATER
SITE 17 - BOAT BASIN
NTC GREAT LAKES

Scenario Timeframe: Current/Future
Medium: Surface water
Exposure Medium:Surface Water
Exposure Point: Site 17 - Boat Basin

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Bromodichloromethane	ug/L	5.40E-01	******	7.40E-01	J	ug/L	7.40E-01	max	5
Chlorodibromomethane	ug/L	5.90E-01	******	5.90E-01	J	ug/L	5.90E-01	max	5
Chloroform	ug/L	8.10E-01	******	1.20E+00		ug/L	1.20E+00	max	5
cis-1,2-Dichloroethene	ug/L	5.15E+00	******	9.20E+00		ug/L	9.20E+00	max	5
Tetrachloroethene	ug/L	9.05E-01	******	1.40E+00		ug/L	1.40E+00	max	5
Trichloroethene	ug/L	2.98E+00	******	5.50E+00		ug/L	5.50E+00	max	5
Vinyl Chloride	ug/L	7.70E-01	******	7.70E-01	J	ug/L	7.70E-01	max	5
4,4'-DDD	ug/L	5.40E-03	******	5.40E-03	J	ug/L	5.40E-03	max	5
4,4'-DDE	ug/L	1.35E-02	******	2.40E-02	J	ug/L	2.40E-02	max	5
4,4'-DDT	ug/L	2.90E-02	******	2.90E-02	J	ug/L	2.90E-02	max	5
Aluminum	ug/L	2.38E+03	******	9.46E+03		ug/L	9.46E+03	max	5
Arsenic	ug/L	3.73E+00	******	3.80E+00		ug/L	3.80E+00	max	5
Chromium	ug/L	1.44E+01	******	1.44E+01		ug/L	1.44E+01	max	5
Iron	ug/L	2.81E+03	******	1.09E+04		ug/L	1.09E+04	max	5
Lead	ug/L	7.82E+00	******	1.80E+01		ug/L	1.80E+01	max	5
Manganese	ug/L	8.31E+01	******	2.45E+02		ug/L	2.45E+02	max	5
Mercury	ug/L	7.00E-02	******	1.00E-01		ug/L	1.00E-01	max	5

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-L);
UCL = Upper Confidence Level
EPC = Exposure Point Concentration
J = Estimated Concentration
Potential Rationale
(1) Shapiro-Wilk W Test indicates data are log-normally distributed
(2) Shapiro-Wilk W Test indicates data are normally distributed
(3) Shapiro-Wilk W Test is inconclusive. Therefore, data are assumed to be lognormally distributed.
(4) The 95% UCL exceeded the maximum; therefore the maximum was used.
(5) There were less than 10 samples taken. Therefore, the maximum detected concentration was used.

TABLE 5-1

NON-CANCER TOXICITY DATA - ORAL/DERMAL
SITE 17 - PETTIBONE CREEK AND THE BOAT BASIN
NTC GREAT LAKES

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD	Oral RfD Units	Oral to Dermal Adjustment Factor [1]	Adjusted Dermal RfD[1]	Dermal RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors [2]	Sources of RfD/Target Organ
Bromodichloromethane	Chronic	2.00E-02	mg/kg-day	1	2.00E-02	mg/kg-day	Renal Cytomegaly	UF = 1000	Iris
Chlorodibromomethane	Chronic	2.00E-02	mg/kg-day	1	2.00E-02	mg/kg-day	Hepatic Lesions	UF = 1000	Iris
Chloroform	Chronic	1.00E-02	mg/kg-day	1	1.00E-02	mg/kg-day	Liver	UF = 100	Iris
cis-1,2-Dichloroethene	Chronic	1.00E-02	mg/kg-day	1	1.00E-02	mg/kg-day	Circulatory		HEAST
Tetrachloroethene	Chronic	1.00E-02	mg/kg-day	1	1.00E-02	mg/kg-day	Body Weight - Liver	UF = 1000	Iris
Trichloroethene	Chronic	6.00E-03	mg/kg-day	1	6.00E-03	mg/kg-day	CNS		NCEA
Vinyl Chloride	Chronic	3.00E-03	mg/kg-day	1	3.00E-03	mg/kg-day	Liver	UF = 30	Iris
Benzo(g,h,I,)perylene [3]	Chronic	3.00E-02	mg/kg-day	1	3.00E-02	mg/kg-day	Kidney	UF = 3000	Iris
Bis(2-ethylhexyl)phthalate	Chronic	2.00E-02	mg/kg-day	1	2.00E-02	mg/kg-day	Liver	UF = 1000	Iris
Fluoranthene	Chronic	4.00E-02	mg/kg-day	1	4.00E-02	mg/kg-day	Blood - Kidney - Liver		Iris
Phenanthrene [3]	Chronic	3.00E-02	mg/kg-day	1	3.00E-02	mg/kg-day	Kidney	UF = 3000	Iris
Pyrene	Chronic	3.00E-02	mg/kg-day	1	3.00E-02	mg/kg-day	Kidney	UF = 3000	Iris
4,4'-DDT	Chronic	5.00E-04	mg/kg-day	1	5.00E-04	mg/kg-day	Liver	UF = 100	Iris
Aldrin	Chronic	3.00E-05	mg/kg-day	1	3.00E-05	mg/kg-day	Liver	UF = 1000	Iris
Alpha-Chlordane [4]	Chronic	5.00E-04	mg/kg-day	1	5.00E-04	mg/kg-day	Hepatic Effects	UF = 300	Iris
Aroclor-1254	Chronic	2.00E-05	mg/kg-day	1	2.00E-05	mg/kg-day	Immunological	UF = 300	Iris
Dieldrin	Chronic	5.00E-05	mg/kg-day	1	5.00E-05	mg/kg-day	Liver	UF = 100	Iris
Endrin Ketone [5]	Chronic	3.00E-04	mg/kg-day	1	3.00E-04	mg/kg-day	Liver - Neurological	UF = 100	Iris/ TACO
Gamma-BHC (Lindane)	Chronic	3.00E-04	mg/kg-day	1	3.00E-04	mg/kg-day	Kidney - Liver	UF = 1000	Iris
Gamma-Chlordane [4]	Chronic	5.00E-04	mg/kg-day	1	5.00E-04	mg/kg-day	Hepatic Effects	UF = 300	Iris
Aluminum	Chronic	1.00E+00	mg/kg-day	1	1.00E+00	mg/kg-day	Body Weight		NCEA
Antimony	Chronic	4.00E-04	mg/kg-day	0.15	6.00E-05	mg/kg-day	Circulatory	UF = 1000	Iris
Arsenic	Chronic	3.00E-04	mg/kg-day	1	3.00E-04	mg/kg-day	Skin - Cardiovascular	UF = 3	Iris
Beryllium	Chronic	2.00E-03	mg/kg-day			mg/kg-day	Gastrointestinal	UF = 300	Iris
Cadmium -water	Chronic	5.00E-04	mg/kg-day	0.025	1.25E-05	mg/kg-day	Kidney - Ingestion	UF = 10	Iris
Cadmium - soil	Chronic	1.00E-03	mg/kg-day	0.025	2.50E-05	mg/kg-day	Kidney - Ingestion	UF = 10	Iris
Chromium [6]	Chronic	3.00E-03	mg/kg-day	0.025	7.50E-05	mg/kg-day	Respiratory	UF = 300 MF = 3	Iris
Cobalt	Chronic	6.00E-02	mg/kg-day	1	6.00E-02	mg/kg-day	Cardiovascular, Neurological, Immuniological		NCEA
Copper	Chronic	3.71E-02	mg/kg-day	1	3.71E-02	mg/kg-day	Gastrointestinal		HEAST
Iron - Adult	Chronic	6.00E-01	mg/kg-day	1	6.00E-01	mg/kg-day	Gastrointestinal		NCEA
Iron - Child	Chronic	1.10E+00	mg/kg-day	1	1.10E+00	mg/kg-day	Gastrointestinal		NCEA
Manganese--soil	Chronic	1.4E-01	mg/kg-day	0.04	5.60E-03	mg/kg-day	Neurological	UF = 1	Iris
Manganese--water	Chronic	4.6E-02	mg/kg-day	0.04	1.84E-03	mg/kg-day	Neurological	UF = 1	Iris
Mercury [7]	Chronic	3.00E-04	mg/kg-day	0.07	2.10E-05	mg/kg-day	Neurological - inh Immuniological - ing	UF = 30	Iris
Nickel	Chronic	2.00E-02	mg/kg-day	0.04	8.00E-04	mg/kg-day	Body Weight	UF = 300	Iris
Selenium	Chronic	5.00E-03	mg/kg-day	1	5.00E-03	mg/kg-day	Skin - Neurological	UF = 3	Iris
Thallium [8]	Chronic	8.00E-05	mg/kg-day	1	8.00E-05	mg/kg-day	Increased levels of SGOT and LDH	UF = 3000	Iris
Vanadium	Chronic	7.00E-03	mg/kg-day	0.026	1.82E-04	mg/kg-day	NOEL		HEAST
Zinc	Chronic	3.00E-01	mg/kg-day	1	3.00E-01	mg/kg-day	Blood	UF = 3	Iris

Source: Iris, Region 9 PRGs.
HEAST = Health Effects Assessment Summary Tables (USEPA, July 1997)
NCEA = USEPA National Center for Environmental Assessment (USEPA Region 9 PRG Table, November 2000)
[1] RfD dermal = RfDoral x (Oral to Dermal Adjustment Factor) as given in RAGS Part E (USEPA, Sept. 2001).
[2] Modifying Factor not shown if equal to unity.
[3] Value given for Pyrene.
[4] Value given for Chlordane.
[6] Value given for hexavalent chromium..
[7] Lead will be evaluated using the EPA Technical Workgroup for Lead, USEPA 1996
[8] Value given for Thallium Carbonate

RfD = Reference dose
UF = Uncertainty Factor
MF = Modifying Factor
EPA 9 = USEPA Region 9 Preliminary Remediation Goals
NA = Not Available
TACO = Illinois Tiered Approach to Corrective Action Objectives.
NOEL = No-observed-effect-level .

TABLE 6-1

CANCER TOXICITY DATA - ORAL/DERMAL
SITE 17 - PETTIBONE CREEK AND THE BOAT BASIN
NTC GREAT LAKES

Chemical of Potential Concern	Oral CSF	Oral to Dermal Adjustment Factor[1]	Adjusted Dermal Cancer Slope Factor[1]	Units	Weight of Evidence/ Cancer Guideline Description	Comments
Benzo(a)anthracene	7.3E-01	1	7.30E-01	$(mg/kg\text{-}day)^{-1}$	B2	NCEA
Benzo(a)pyrene	7.3E+00	1	7.30E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS
Benzo(b)fluoranthene	7.3E-01	1	7.30E-01	$(mg/kg\text{-}day)^{-1}$	B2	NCEA
Benzo(k)fluoranthene	7.3E-02	1	7.30E-02	$(mg/kg\text{-}day)^{-1}$	B2	NCEA
Bis(2-ethylhexyl)phthalate	1.4E-02	1	1.40E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS
Chrysene	7.3E-03	1	7.30E-03	$(mg/kg\text{-}day)^{-1}$	B2	NCEA
Indeno(1,2,3-cd)pyrene	7.3E-01	1	7.30E-01	$(mg/kg\text{-}day)^{-1}$	B2	NCEA
4,4'-DDD	2.4E-01	1	2.40E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS
4,4'-DDE	3.4E-01	1	3.40E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS
4,4'-DDT	3.4E-01	1	3.40E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS
Aldrin	1.7E+01	1	1.70E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS
Alpha-BHC	6.3E+00	1	6.30E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS
Alpha-Chlordane [2]	3.5E-01	1	3.50E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS
Aroclor-1254	2.0E+00	1	2.00E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS
Aroclor-1260	2.0E+00	1	2.00E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS
Dieldrin	1.6E+01	1	1.60E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS
Gamma-BHC (Lindane)	1.3E+00	1	1.30E+00	$(mg/kg\text{-}day)^{-1}$	B2	HEAST
Gamma-Chlordane [2]	3.5E-01	1	3.50E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS
Arsenic	1.5E+00	1	1.50E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS

Source: Iris, Region 9 PRGs.
HEAST = Health Effects Assessment Summary Tables (USEPA, July 1997)
NCEA = USEPA National Center for Environmental Assessment (USEPA Region 9 PRG Table, November 2000)

[1] CSFdermal = CSForal/(Oral to Dermal Adjustment Factor)
If no adjustment recommended, factor = 1.00.
Source: RAGS E (USEPA September 2001)

[2] Value given for chlordane.

EPA Group:
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity
NA - Not Available

Notes:
CSF = Cancer Slope Factor

TABLE 7.1 A
REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	3.8E-07	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	3.8E-07	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	4.0E-07	mg/kg-day		mg/kg-day			
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	2.2E-07	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	9.55E-01	mg/kg	M	1.9E-07	mg/kg-day		mg/kg-day			
	4,4'-DDT	4.40E-01	mg/kg	4.40E-01	mg/kg	M	9.0E-08	mg/kg-day	5.00E-04	mg/kg-day			1.8E-04
	Aroclor-1254	2.57E-01	mg/kg	2.57E-01	mg/kg	M	5.2E-08	mg/kg-day	2.00E-05	mg/kg-day			2.6E-03
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	1.3E-06	mg/kg-day	3.00E-04	mg/kg-day			4.3E-03
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	3.6E-07	mg/kg-day	1.00E-03	mg/kg-day			3.6E-04
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	3.9E-06	mg/kg-day	3.00E-03	mg/kg-day			1.3E-03
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	4.5E-05	mg/kg-day	3.71E-02	mg/kg-day			1.2E-03
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	1.1E-07	mg/kg-day	3.00E-04	mg/kg-day			3.6E-04
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	2.3E-07	mg/kg-day	8.00E-05	mg/kg-day			2.8E-03
	(total)												1.3E-02
Dermal	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	1.4E-06	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	1.4E-06	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	1.4E-06	mg/kg-day		mg/kg-day			
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	7.8E-07	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	9.55E-01	mg/kg	M	7.0E-07	mg/kg-day		mg/kg-day			
	4,4'-DDT	4.40E-01	mg/kg	4.40E-01	mg/kg	M	0.0E+00	mg/kg-day	5.00E-04	mg/kg-day			0.0E+00
	Aroclor-1254	2.57E-01	mg/kg	2.57E-01	mg/kg	M	2.0E-07	mg/kg-day	2.00E-05	mg/kg-day			1.0E-02
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	1.1E-06	mg/kg-day	3.00E-04	mg/kg-day			3.6E-03
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	0.0E+00	mg/kg-day	2.50E-05	mg/kg-day			0.0E+00
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	0.0E+00	mg/kg-day	7.50E-05	mg/kg-day			0.0E+00
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	0.0E+00	mg/kg-day	3.71E-02	mg/kg-day			0.0E+00
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	0.0E+00	mg/kg-day	2.10E-05	mg/kg-day			0.0E+00
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	0.0E+00	mg/kg-day	8.00E-05	mg/kg-day			0.0E+00
	(total)												1.4E-02
												Total Hazard Index Across All Exposure Routes/Pathways	**2.7E-02**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 7.1 B
CENTRAL TENDANCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	9.4E-08	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	9.5E-08	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	9.9E-08	mg/kg-day		mg/kg-day			
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	5.5E-08	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	9.55E-01	mg/kg	M	4.9E-08	mg/kg-day		mg/kg-day			
	4,4'-DDT	4.40E-01	mg/kg	4.40E-01	mg/kg	M	2.2E-08	mg/kg-day	5.00E-04	mg/kg-day			4.5E-05
	Aroclor-1254	2.57E-01	mg/kg	2.57E-01	mg/kg	M	1.3E-08	mg/kg-day	2.00E-05	mg/kg-day			6.5E-04
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	3.3E-07	mg/kg-day	3.00E-04	mg/kg-day			1.1E-03
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	9.0E-08	mg/kg-day	1.00E-03	mg/kg-day			9.0E-05
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	9.8E-07	mg/kg-day	3.00E-03	mg/kg-day			3.3E-04
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	1.1E-05	mg/kg-day	3.71E-02	mg/kg-day			3.0E-04
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	2.7E-08	mg/kg-day	3.00E-04	mg/kg-day			9.1E-05
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	5.7E-08	mg/kg-day	8.00E-05	mg/kg-day			7.1E-04
	(total)												3.3E-03
Dermal	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	7.6E-08	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	7.7E-08	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	8.0E-08	mg/kg-day		mg/kg-day			
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	4.4E-08	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	9.55E-01	mg/kg	M	3.9E-08	mg/kg-day		mg/kg-day			
	4,4'-DDT	4.40E-01	mg/kg	4.40E-01	mg/kg	M	0.0E+00	mg/kg-day	5.00E-04	mg/kg-day			0.0E+00
	Aroclor-1254	2.57E-01	mg/kg	2.57E-01	mg/kg	M	1.1E-08	mg/kg-day	2.00E-05	mg/kg-day			5.7E-04
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	6.1E-08	mg/kg-day	3.00E-04	mg/kg-day			2.0E-04
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	0.0E+00	mg/kg-day	2.50E-05	mg/kg-day			0.0E+00
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	0.0E+00	mg/kg-day	7.50E-05	mg/kg-day			0.0E+00
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	0.0E+00	mg/kg-day	3.71E-02	mg/kg-day			0.0E+00
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	0.0E+00	mg/kg-day	2.10E-05	mg/kg-day			0.0E+00
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	0.0E+00	mg/kg-day	8.00E-05	mg/kg-day			0.0E+00
	(total)												7.7E-04
												Total Hazard Index Across All Exposure Routes/Pathways	**4.1E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 8.1 A
REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	1.3E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	9.5E-08
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	1.3E-07	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	9.5E-07
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	1.4E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	9.9E-08
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	7.5E-08	mg/kg-day	7.30E-02	$(mg/kg\text{-}day)^{-1}$	5.5E-09
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	2.57E-01	mg/kg	M	6.7E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	4.9E-08
	4,4'-DDT	4.40E-01	mg/kg	6.40E+00	mg/kg	M	3.1E-08	mg/kg-day	3.40E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-08
	Aroclor-1254	2.57E-01	mg/kg	1.76E+00	mg/kg	M	1.8E-08	mg/kg-day	2.00E+00	$(mg/kg\text{-}day)^{-1}$	3.6E-08
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	4.5E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	6.7E-07
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	1.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	1.3E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	1.5E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	3.8E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	7.8E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.9E-06
Dermal	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	4.6E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	3.4E-07
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	4.7E-07	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-06
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	4.9E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	3.6E-07
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	2.7E-07	mg/kg-day	7.30E-02	$(mg/kg\text{-}day)^{-1}$	2.0E-08
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	9.55E-01	mg/kg	M	2.4E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-07
	4,4'-DDT	4.40E-01	mg/kg	4.40E-01	mg/kg	M	0.0E+00	mg/kg-day	3.40E-01	$(mg/kg\text{-}day)^{-1}$	0.0E+00
	Aroclor-1254	2.57E-01	mg/kg	2.57E-01	mg/kg	M	6.9E-08	mg/kg-day	2.00E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-07
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	3.7E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	5.5E-07
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										5.0E-06
											6.9E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.1 B
CENTRAL TENDANCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	9.4E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	6.9E-09
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	9.5E-09	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	6.9E-08
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	9.9E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	7.2E-09
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	5.5E-09	mg/kg-day	7.30E-02	$(mg/kg\text{-}day)^{-1}$	4.0E-10
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	2.57E-01	mg/kg	M	4.9E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	3.5E-09
	4,4'-DDT	4.40E-01	mg/kg	6.40E+00	mg/kg	M	2.2E-09	mg/kg-day	3.40E-01	$(mg/kg\text{-}day)^{-1}$	7.6E-10
	Aroclor-1254	2.57E-01	mg/kg	1.76E+00	mg/kg	M	1.3E-09	mg/kg-day	2.00E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-09
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	3.3E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	4.9E-08
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	9.0E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	9.8E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	1.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	2.7E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	5.7E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.4E-07
Dermal	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	7.6E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	5.6E-09
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	7.7E-09	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	5.6E-08
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	8.0E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	5.8E-09
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	4.4E-09	mg/kg-day	7.30E-02	$(mg/kg\text{-}day)^{-1}$	3.2E-10
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	9.55E-01	mg/kg	M	3.9E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-09
	4,4'-DDT	4.40E-01	mg/kg	4.40E-01	mg/kg	M	0.0E+00	mg/kg-day	3.40E-01	$(mg/kg\text{-}day)^{-1}$	0.0E+00
	Aroclor-1254	2.57E-01	mg/kg	2.57E-01	mg/kg	M	1.1E-09	mg/kg-day	2.00E+00	$(mg/kg\text{-}day)^{-1}$	2.3E-09
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	6.1E-09	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	9.1E-09
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										8.2E-08
											2.2E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 7.2 A
REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	6.3E-07	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	6.3E-07	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	6.6E-07	mg/kg-day		mg/kg-day			
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	3.6E-07	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	9.55E-01	mg/kg	M	3.2E-07	mg/kg-day		mg/kg-day			
	4,4'-DDT	4.40E-01	mg/kg	4.40E-01	mg/kg	M	1.5E-07	mg/kg-day	5.00E-04	mg/kg-day			3.0E-04
	Aroclor-1254	2.57E-01	mg/kg	2.57E-01	mg/kg	M	8.7E-08	mg/kg-day	2.00E-05	mg/kg-day			4.4E-03
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	2.2E-06	mg/kg-day	3.00E-04	mg/kg-day			7.2E-03
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	6.0E-07	mg/kg-day	1.00E-03	mg/kg-day			6.0E-04
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	6.5E-06	mg/kg-day	3.00E-03	mg/kg-day			2.2E-03
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	7.5E-05	mg/kg-day	3.71E-02	mg/kg-day			2.0E-03
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	1.8E-07	mg/kg-day	3.00E-04	mg/kg-day			6.1E-04
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	3.8E-07	mg/kg-day	8.00E-05	mg/kg-day			4.7E-03
	(total)												2.2E-02
Dermal	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	8.1E-07	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	8.1E-07	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	8.5E-07	mg/kg-day		mg/kg-day			
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	4.7E-07	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	9.55E-01	mg/kg	M	4.1E-07	mg/kg-day		mg/kg-day			
	4,4'-DDT	4.40E-01	mg/kg	4.40E-01	mg/kg	M	0.0E+00	mg/kg-day	5.00E-04	mg/kg-day			0.0E+00
	Aroclor-1254	2.57E-01	mg/kg	2.57E-01	mg/kg	M	1.2E-07	mg/kg-day	2.00E-05	mg/kg-day			6.0E-03
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	6.4E-07	mg/kg-day	3.00E-04	mg/kg-day			2.1E-03
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	0.0E+00	mg/kg-day	2.50E-05	mg/kg-day			0.0E+00
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	0.0E+00	mg/kg-day	7.50E-05	mg/kg-day			0.0E+00
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	0.0E+00	mg/kg-day	3.71E-02	mg/kg-day			0.0E+00
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	0.0E+00	mg/kg-day	2.10E-05	mg/kg-day			0.0E+00
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	0.0E+00	mg/kg-day	8.00E-05	mg/kg-day			0.0E+00
	(total)												8.1E-03
										Total Hazard Index Across All Exposure Routes/Pathways			**3.0E-02**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 7.2 B
CENTRAL TENDANCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	1.6E-07	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	1.6E-07	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	1.7E-07	mg/kg-day		mg/kg-day			
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	9.1E-08	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	9.55E-01	mg/kg	M	8.1E-08	mg/kg-day		mg/kg-day			
	4,4'-DDT	4.40E-01	mg/kg	4.40E-01	mg/kg	M	3.7E-08	mg/kg-day	5.00E-04	mg/kg-day			7.5E-05
	Aroclor-1254	2.57E-01	mg/kg	2.57E-01	mg/kg	M	2.2E-08	mg/kg-day	2.00E-05	mg/kg-day			1.1E-03
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	5.4E-07	mg/kg-day	3.00E-04	mg/kg-day			1.8E-03
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	1.5E-07	mg/kg-day	1.00E-03	mg/kg-day			1.5E-04
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	1.6E-06	mg/kg-day	3.00E-03	mg/kg-day			5.4E-04
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	1.9E-05	mg/kg-day	3.71E-02	mg/kg-day			5.0E-04
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	4.6E-08	mg/kg-day	3.00E-04	mg/kg-day			1.5E-04
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	9.5E-08	mg/kg-day	8.00E-05	mg/kg-day			1.2E-03
	(total)												5.5E-03
Dermal	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	5.1E-08	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	5.1E-08	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	5.3E-08	mg/kg-day		mg/kg-day			
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	2.9E-08	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	9.55E-01	mg/kg	M	2.6E-08	mg/kg-day		mg/kg-day			
	4,4'-DDT	4.40E-01	mg/kg	4.40E-01	mg/kg	M	0.0E+00	mg/kg-day	5.00E-04	mg/kg-day			0.0E+00
	Aroclor-1254	2.57E-01	mg/kg	2.57E-01	mg/kg	M	7.6E-09	mg/kg-day	2.00E-05	mg/kg-day			3.8E-04
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	4.0E-08	mg/kg-day	3.00E-04	mg/kg-day			1.3E-04
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	0.0E+00	mg/kg-day	2.50E-05	mg/kg-day			0.0E+00
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	0.0E+00	mg/kg-day	7.50E-05	mg/kg-day			0.0E+00
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	0.0E+00	mg/kg-day	3.71E-02	mg/kg-day			0.0E+00
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	0.0E+00	mg/kg-day	2.10E-05	mg/kg-day			0.0E+00
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	0.0E+00	mg/kg-day	8.00E-05	mg/kg-day			0.0E+00
	(total)												5.1E-04
										Total Hazard Index Across All Exposure Routes/Pathways			**6.0E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 8.2 A
REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	9.0E-08	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	6.6E-08
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	9.1E-08	mg/kg-day	7.30E+00	$(mg/kg-day)^{-1}$	6.6E-07
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	9.4E-08	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	6.9E-08
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	5.2E-08	mg/kg-day	7.30E-02	$(mg/kg-day)^{-1}$	3.8E-09
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	2.57E-01	mg/kg	M	4.6E-08	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	3.4E-08
	4,4'-DDT	4.40E-01	mg/kg	6.40E+00	mg/kg	M	2.1E-08	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	7.3E-09
	Aroclor-1254	2.57E-01	mg/kg	1.76E+00	mg/kg	M	1.2E-08	mg/kg-day	2.00E+00	$(mg/kg-day)^{-1}$	2.5E-08
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	3.1E-07	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	4.7E-07
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	8.5E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	9.3E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	1.1E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	2.6E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	5.4E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										1.3E-06
Dermal	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	1.2E-07	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	8.4E-08
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	1.2E-07	mg/kg-day	7.30E+00	$(mg/kg-day)^{-1}$	8.5E-07
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	1.2E-07	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	8.8E-08
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	6.6E-08	mg/kg-day	7.30E-02	$(mg/kg-day)^{-1}$	4.9E-09
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	9.55E-01	mg/kg	M	5.9E-08	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	4.3E-08
	4,4'-DDT	4.40E-01	mg/kg	4.40E-01	mg/kg	M	0.0E+00	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	0.0E+00
	Aroclor-1254	2.57E-01	mg/kg	2.57E-01	mg/kg	M	1.7E-08	mg/kg-day	2.00E+00	$(mg/kg-day)^{-1}$	3.4E-08
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	9.2E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.4E-07
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg-day)^{-1}$	
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg-day)^{-1}$	
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										1.2E-06
											2.6E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.2 B
CENTRAL TENDANCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	2.2E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-08
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	2.3E-08	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-07
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	2.4E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	1.3E-08	mg/kg-day	7.30E-02	$(mg/kg\text{-}day)^{-1}$	9.5E-10
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	2.57E-01	mg/kg	M	1.2E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	8.4E-09
	4,4'-DDT	4.40E-01	mg/kg	6.40E+00	mg/kg	M	5.3E-09	mg/kg-day	3.40E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-09
	Aroclor-1254	2.57E-01	mg/kg	1.76E+00	mg/kg	M	3.1E-09	mg/kg-day	2.00E+00	$(mg/kg\text{-}day)^{-1}$	6.2E-09
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	7.8E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	2.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	2.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	2.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	6.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	1.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										3.3E-07
Dermal	Benzo(a)anthracene	1.86E+00	mg/kg	1.86E+00	mg/kg	M	7.3E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	5.3E-09
	Benzo(a)pyrene	1.87E+00	mg/kg	1.87E+00	mg/kg	M	7.3E-09	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	5.3E-08
	Benzo(b)fluoranthene	1.95E+00	mg/kg	1.95E+00	mg/kg	M	7.6E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	5.6E-09
	Benzo(k)fluoranthene	1.07E+00	mg/kg	1.07E+00	mg/kg	M	4.2E-09	mg/kg-day	7.30E-02	$(mg/kg\text{-}day)^{-1}$	3.1E-10
	Indeno(1,2,3-cd)pyrene	9.55E-01	mg/kg	9.55E-01	mg/kg	M	3.7E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.7E-09
	4,4'-DDT	4.40E-01	mg/kg	4.40E-01	mg/kg	M	0.0E+00	mg/kg-day	3.40E-01	$(mg/kg\text{-}day)^{-1}$	0.0E+00
	Aroclor-1254	2.57E-01	mg/kg	2.57E-01	mg/kg	M	1.1E-09	mg/kg-day	2.00E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-09
	Arsenic	6.40E+00	mg/kg	6.40E+00	mg/kg	M	5.8E-09	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	8.7E-09
	Cadmium	1.76E+00	mg/kg	1.76E+00	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	1.92E+01	mg/kg	1.92E+01	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Copper	2.20E+02	mg/kg	2.20E+02	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	5.38E-01	mg/kg	5.38E-01	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Thallium	1.12E+00	mg/kg	1.12E+00	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										7.8E-08
											4.1E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 7.3 A
REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT
SITE 17 - SOUTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: South Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	1.2E-07	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	5.1E-08	mg/kg-day		mg/kg-day			
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	2.1E-07	mg/kg-day	8.00E-05	mg/kg-day			2.7E-03
	(total)												2.7E-03
Dermal	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	4.2E-07	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	3.9E-07	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	3.8E-07	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	1.8E-07	mg/kg-day		mg/kg-day			
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	0.0E+00	mg/kg-day	8.00E-05	mg/kg-day			0.0E+00
	(total)												0.0E+00
												Total Hazard Index Across All Exposure Routes/Pathways	**2.7E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 7.3 B
CENTRAL TENDANCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT
SITE 17 - SOUTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: South Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	2.9E-08	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	2.7E-08	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	2.7E-08	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	1.3E-08	mg/kg-day		mg/kg-day			
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	5.3E-08	mg/kg-day	8.00E-05	mg/kg-day			6.6E-04
	(total)												6.6E-04
Dermal	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	2.3E-08	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	2.2E-08	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	2.1E-08	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	1.0E-08	mg/kg-day		mg/kg-day			
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	0.0E+00	mg/kg-day	8.00E-05	mg/kg-day			0.0E+00
	(total)												0.0E+00
												Total Hazard Index Across All Exposure Routes/Pathways	**6.6E-04**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 8.3 A
REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT
SITE 17 - SOUTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: South Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	4.0E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-08
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	3.8E-08	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	2.7E-07
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	3.6E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.7E-08
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	1.7E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-08
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	7.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										3.4E-07
Dermal	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	1.4E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-07
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	1.3E-07	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	9.8E-07
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	1.3E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	9.5E-08
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	6.3E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-08
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.2E-06
											1.6E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.3 B
CENTRAL TENDANCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT
SITE 17 - SOUTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: South Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	2.9E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.1E-09
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	2.7E-09	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-08
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	2.7E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-09
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	1.3E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	9.3E-10
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	5.3E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										2.5E-08
Dermal	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	2.3E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-09
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	2.2E-09	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-08
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	2.1E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-09
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	1.0E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	7.5E-10
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										2.0E-08
											4.5E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 7.4 A
REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - SOUTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: South Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	1.9E-07	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	1.8E-07	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	1.8E-07	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	8.5E-08	mg/kg-day		mg/kg-day			
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	3.5E-07	mg/kg-day	8.00E-05	mg/kg-day			4.4E-03
	(total)												4.4E-03
Dermal	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	2.5E-07	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	2.3E-07	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	2.3E-07	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day			
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	0.0E+00	mg/kg-day	8.00E-05	mg/kg-day			0.0E+00
	(total)												0.0E+00
												Total Hazard Index Across All Exposure Routes/Pathways	**4.4E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 7.4 B
CENTRAL TENDANCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - SOUTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: South Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	4.8E-08	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	4.6E-08	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	4.4E-08	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	2.1E-08	mg/kg-day		mg/kg-day			
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	8.9E-08	mg/kg-day	8.00E-05	mg/kg-day			1.1E-03
	(total)												1.1E-03
Dermal	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	1.6E-08	mg/kg-day		mg/kg-day			
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day			
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	1.4E-08	mg/kg-day		mg/kg-day			
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	6.8E-09	mg/kg-day		mg/kg-day			
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	0.0E+00	mg/kg-day	8.00E-05	mg/kg-day			0.0E+00
	(total)												0.0E+00
										Total Hazard Index Across All Exposure Routes/Pathways			**1.1E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 8.4 A
REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - SOUTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: South Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	2.8E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-08
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	2.6E-08	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-07
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	2.5E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-08
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	1.2E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	8.8E-09
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	5.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										2.4E-07
Dermal	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	3.5E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.6E-08
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	3.3E-08	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-07
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	3.2E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-08
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	1.5E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										3.0E-07
											5.4E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.4 B
CENTRAL TENDANCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - SOUTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: South Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	6.9E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	5.0E-09
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	6.5E-09	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	4.8E-08
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	6.3E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-09
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	3.0E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-09
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	1.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										5.9E-08
Dermal	Benzo(a)anthracene	5.70E-01	mg/kg	5.70E-01	mg/kg	M	2.2E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-09
	Benzo(a)pyrene	5.38E-01	mg/kg	5.38E-01	mg/kg	M	2.1E-09	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Benzo(b)fluoranthene	5.22E-01	mg/kg	5.22E-01	mg/kg	M	2.0E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-09
	Indeno(1,2,3-cd)pyrene	2.50E-01	mg/kg	2.50E-01	mg/kg	M	9.8E-10	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	7.1E-10
	Thallium	1.05E+00	mg/kg	1.05E+00	mg/kg	M	0.0E+00	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.9E-08
											7.9E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 7.7 A
REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	1.5E-07	mg/kg-day	2.00E-02	mg/kg-day			7.5E-06
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	1.2E-07	mg/kg-day	2.00E-02	mg/kg-day			6.0E-06
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	2.4E-07	mg/kg-day	1.00E-02	mg/kg-day			2.4E-05
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	1.9E-06	mg/kg-day	1.00E-02	mg/kg-day			1.9E-04
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	2.8E-07	mg/kg-day	1.00E-02	mg/kg-day			2.8E-05
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	1.1E-06	mg/kg-day	6.00E-03	mg/kg-day			1.9E-04
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	1.6E-07	mg/kg-day	3.00E-03	mg/kg-day			5.2E-05
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	1.1E-09	mg/kg-day		mg/kg-day			
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	4.9E-09	mg/kg-day		mg/kg-day			
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	5.9E-09	mg/kg-day	5.00E-04	mg/kg-day			1.2E-05
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	1.9E-03	mg/kg-day	1.00E+00	mg/kg-day			1.9E-03
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	7.7E-07	mg/kg-day	3.00E-04	mg/kg-day			2.6E-03
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	2.9E-06	mg/kg-day	3.00E-03	mg/kg-day			9.8E-04
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	2.2E-03	mg/kg-day	6.00E-01	mg/kg-day			3.7E-03
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	3.7E-06	mg/kg-day		mg/kg-day			
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	5.0E-05	mg/kg-day	4.60E-02	mg/kg-day			1.1E-03
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	2.0E-08	mg/kg-day	3.00E-04	mg/kg-day			6.8E-05
	(total)												1.1E-02
Dermal	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	2.3E-07	mg/kg-day	2.00E-02	mg/kg-day			1.2E-05
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	1.7E-07	mg/kg-day	2.00E-02	mg/kg-day			8.6E-06
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	4.5E-07	mg/kg-day	1.00E-02	mg/kg-day			4.5E-05
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	3.6E-06	mg/kg-day	1.00E-02	mg/kg-day			3.6E-04
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	3.2E-06	mg/kg-day	1.00E-02	mg/kg-day			3.2E-04
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	3.7E-06	mg/kg-day	6.00E-03	mg/kg-day			6.1E-04
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	2.0E-07	mg/kg-day	3.00E-03	mg/kg-day			6.6E-05
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	1.4E-07	mg/kg-day		mg/kg-day			
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	5.3E-07	mg/kg-day		mg/kg-day			
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	1.2E-06	mg/kg-day	5.00E-04	mg/kg-day			2.4E-03
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	3.5E-04	mg/kg-day	1.00E+00	mg/kg-day			3.5E-04
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	1.4E-07	mg/kg-day	3.00E-04	mg/kg-day			4.7E-04
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	1.1E-06	mg/kg-day	7.50E-05	mg/kg-day			1.4E-02
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	4.1E-04	mg/kg-day	6.00E-01	mg/kg-day			6.8E-04
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	6.7E-07	mg/kg-day		mg/kg-day			
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	9.2E-06	mg/kg-day	1.84E-03	mg/kg-day			5.0E-03
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	3.7E-09	mg/kg-day	2.10E-05	mg/kg-day			1.8E-04
	(total)												2.5E-02

Total Hazard Index Across All Exposure Routes/Pathways **3.6E-02**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 7.7 B
CENTRAL TENDANCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	3.8E-08	mg/kg-day	2.00E-02	mg/kg-day			1.9E-06
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	3.0E-08	mg/kg-day	2.00E-02	mg/kg-day			1.5E-06
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	6.1E-08	mg/kg-day	1.00E-02	mg/kg-day			6.1E-06
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	4.7E-07	mg/kg-day	1.00E-02	mg/kg-day			4.7E-05
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	7.1E-08	mg/kg-day	1.00E-02	mg/kg-day			7.1E-06
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	2.8E-07	mg/kg-day	6.00E-03	mg/kg-day			4.7E-05
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	3.9E-08	mg/kg-day	3.00E-03	mg/kg-day			1.3E-05
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	2.7E-10	mg/kg-day		mg/kg-day			
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	1.2E-09	mg/kg-day		mg/kg-day			
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	1.5E-09	mg/kg-day	5.00E-04	mg/kg-day			3.0E-06
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	4.8E-04	mg/kg-day	1.00E+00	mg/kg-day			4.8E-04
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	1.9E-07	mg/kg-day	3.00E-04	mg/kg-day			6.4E-04
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	7.3E-07	mg/kg-day	3.00E-03	mg/kg-day			2.4E-04
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	5.5E-04	mg/kg-day	6.00E-01	mg/kg-day			9.2E-04
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	9.2E-07	mg/kg-day		mg/kg-day			
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	1.2E-05	mg/kg-day	4.60E-02	mg/kg-day			2.7E-04
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	5.1E-09	mg/kg-day	3.00E-04	mg/kg-day			1.7E-05
	(total)												2.7E-03
Dermal	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	6.9E-08	mg/kg-day	2.00E-02	mg/kg-day			3.5E-06
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	5.1E-08	mg/kg-day	2.00E-02	mg/kg-day			2.6E-06
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	1.2E-07	mg/kg-day	1.00E-02	mg/kg-day			1.2E-05
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	9.6E-07	mg/kg-day	1.00E-02	mg/kg-day			9.6E-05
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	9.5E-07	mg/kg-day	1.00E-02	mg/kg-day			9.5E-05
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	1.0E-06	mg/kg-day	6.00E-03	mg/kg-day			1.7E-04
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	5.0E-08	mg/kg-day	3.00E-03	mg/kg-day			1.7E-05
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	4.1E-08	mg/kg-day		mg/kg-day			
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	1.6E-07	mg/kg-day		mg/kg-day			
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	3.6E-07	mg/kg-day	5.00E-04	mg/kg-day			7.3E-04
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	7.5E-05	mg/kg-day	1.00E+00	mg/kg-day			7.5E-05
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	3.0E-08	mg/kg-day	3.00E-04	mg/kg-day			1.0E-04
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	2.3E-07	mg/kg-day	7.50E-05	mg/kg-day			3.0E-03
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	8.6E-05	mg/kg-day	6.00E-01	mg/kg-day			1.4E-04
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	1.4E-07	mg/kg-day		mg/kg-day			
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	1.9E-06	mg/kg-day	1.84E-03	mg/kg-day			1.1E-03
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	7.9E-10	mg/kg-day	2.10E-05	mg/kg-day			3.8E-05
	(total)												5.6E-03
										Total Hazard Index Across All Exposure Routes/Pathways			**8.3E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 8.7 A
REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	5.2E-08	mg/kg-day	6.20E-02	$(mg/kg-day)^{-1}$	3.2E-09
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	4.1E-08	mg/kg-day	8.40E-02	$(mg/kg-day)^{-1}$	3.5E-09
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	8.4E-08	mg/kg-day	6.10E-03	$(mg/kg-day)^{-1}$	5.1E-10
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	6.4E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	9.8E-08	mg/kg-day	5.20E-02	$(mg/kg-day)^{-1}$	5.1E-09
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	3.8E-07	mg/kg-day	1.10E-02	$(mg/kg-day)^{-1}$	4.2E-09
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	5.4E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	8.1E-08
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	3.8E-10	mg/kg-day	2.40E-01	$(mg/kg-day)^{-1}$	9.0E-11
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	1.7E-09	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	5.7E-10
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	2.0E-09	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	6.9E-10
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	6.6E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	2.7E-07	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	4.0E-07
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	1.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	7.6E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	1.3E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	1.7E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	7.0E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										5.0E-07
Dermal	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	7.9E-08	mg/kg-day	6.20E-02	$(mg/kg-day)^{-1}$	4.9E-09
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	5.9E-08	mg/kg-day	8.40E-02	$(mg/kg-day)^{-1}$	4.9E-09
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	1.5E-07	mg/kg-day	6.10E-03	$(mg/kg-day)^{-1}$	9.4E-10
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	1.2E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	1.1E-06	mg/kg-day	5.20E-02	$(mg/kg-day)^{-1}$	5.6E-08
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	1.3E-06	mg/kg-day	1.10E-02	$(mg/kg-day)^{-1}$	1.4E-08
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	6.8E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.0E-07
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	4.8E-08	mg/kg-day	2.40E-01	$(mg/kg-day)^{-1}$	1.1E-08
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	1.8E-07	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	6.2E-08
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	4.2E-07	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	1.4E-07
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	1.2E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	4.9E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	7.3E-08
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	3.7E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	1.4E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	2.3E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	3.1E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	1.3E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										4.7E-07
											9.7E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.7 B
CENTRAL TENDANCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	3.8E-09	mg/kg-day	6.20E-02	$(mg/kg-day)^{-1}$	2.3E-10
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	3.0E-09	mg/kg-day	8.40E-02	$(mg/kg-day)^{-1}$	2.5E-10
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	6.1E-09	mg/kg-day	6.10E-03	$(mg/kg-day)^{-1}$	3.7E-11
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	4.7E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	7.1E-09	mg/kg-day	5.20E-02	$(mg/kg-day)^{-1}$	3.7E-10
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	2.8E-08	mg/kg-day	1.10E-02	$(mg/kg-day)^{-1}$	3.1E-10
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	3.9E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	5.9E-09
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	2.7E-11	mg/kg-day	2.40E-01	$(mg/kg-day)^{-1}$	6.6E-12
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	1.2E-10	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	4.2E-11
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	1.5E-10	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	5.0E-11
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	4.8E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	1.9E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	2.9E-08
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	7.3E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	5.5E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	9.2E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	1.2E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	5.1E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										3.6E-08
Dermal	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	6.9E-09	mg/kg-day	6.20E-02	$(mg/kg-day)^{-1}$	4.3E-10
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	5.1E-09	mg/kg-day	8.40E-02	$(mg/kg-day)^{-1}$	4.3E-10
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	1.2E-08	mg/kg-day	6.10E-03	$(mg/kg-day)^{-1}$	7.6E-11
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	9.6E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	9.5E-08	mg/kg-day	5.20E-02	$(mg/kg-day)^{-1}$	4.9E-09
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	1.0E-07	mg/kg-day	1.10E-02	$(mg/kg-day)^{-1}$	1.2E-09
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	5.0E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	7.5E-09
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	4.1E-09	mg/kg-day	2.40E-01	$(mg/kg-day)^{-1}$	1.0E-09
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	1.6E-08	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	5.4E-09
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	3.6E-08	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	1.2E-08
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	7.5E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	3.0E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	4.5E-09
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	2.3E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	8.6E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	1.4E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	1.9E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	7.9E-11	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										3.8E-08
											7.4E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 7.8 A
REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	2.5E-07	mg/kg-day	2.00E-02	mg/kg-day			1.3E-05
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	2.0E-07	mg/kg-day	2.00E-02	mg/kg-day			1.0E-05
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	4.1E-07	mg/kg-day	1.00E-02	mg/kg-day			4.1E-05
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	3.1E-06	mg/kg-day	1.00E-02	mg/kg-day			3.1E-04
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	4.7E-07	mg/kg-day	1.00E-02	mg/kg-day			4.7E-05
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	1.9E-06	mg/kg-day	6.00E-03	mg/kg-day			3.1E-04
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	2.6E-07	mg/kg-day	3.00E-03	mg/kg-day			8.7E-05
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	1.8E-09	mg/kg-day		mg/kg-day			
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	8.1E-09	mg/kg-day		mg/kg-day			
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	9.8E-09	mg/kg-day	5.00E-04	mg/kg-day			2.0E-05
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	3.2E-03	mg/kg-day	1.00E+00	mg/kg-day			3.2E-03
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	1.3E-06	mg/kg-day	3.00E-04	mg/kg-day			4.3E-03
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	4.9E-06	mg/kg-day	3.00E-03	mg/kg-day			1.6E-03
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	3.7E-03	mg/kg-day	6.00E-01	mg/kg-day			6.2E-03
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	6.1E-06	mg/kg-day		mg/kg-day			
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	8.3E-05	mg/kg-day	4.60E-02	mg/kg-day			1.8E-03
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	3.4E-08	mg/kg-day	3.00E-04	mg/kg-day			1.1E-04
	(total)												1.8E-02
Dermal	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	1.6E-07	mg/kg-day	2.00E-02	mg/kg-day			8.0E-06
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	1.2E-07	mg/kg-day	2.00E-02	mg/kg-day			5.9E-06
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	3.1E-07	mg/kg-day	1.00E-02	mg/kg-day			3.1E-05
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	2.5E-06	mg/kg-day	1.00E-02	mg/kg-day			2.5E-04
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	2.2E-06	mg/kg-day	1.00E-02	mg/kg-day			2.2E-04
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	2.5E-06	mg/kg-day	6.00E-03	mg/kg-day			4.2E-04
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	1.4E-07	mg/kg-day	3.00E-03	mg/kg-day			4.5E-05
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	9.6E-08	mg/kg-day		mg/kg-day			
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	3.7E-07	mg/kg-day		mg/kg-day			
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	8.4E-07	mg/kg-day	5.00E-04	mg/kg-day			1.7E-03
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	2.5E-04	mg/kg-day	1.00E+00	mg/kg-day			2.5E-04
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	9.8E-08	mg/kg-day	3.00E-04	mg/kg-day			3.3E-04
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	7.5E-07	mg/kg-day	7.50E-05	mg/kg-day			1.0E-02
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	2.8E-04	mg/kg-day	6.00E-01	mg/kg-day			4.7E-04
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	4.7E-07	mg/kg-day		mg/kg-day			
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	6.3E-06	mg/kg-day	1.84E-03	mg/kg-day			3.5E-03
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	2.6E-09	mg/kg-day	2.10E-05	mg/kg-day			1.2E-04
	(total)												1.7E-02
												Total Hazard Index Across All Exposure Routes/Pathways	**3.5E-02**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 7.8 B
CENTRAL TENDANCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	6.3E-08	mg/kg-day	2.00E-02	mg/kg-day			3.1E-06
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	5.0E-08	mg/kg-day	2.00E-02	mg/kg-day			2.5E-06
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	1.0E-07	mg/kg-day	1.00E-02	mg/kg-day			1.0E-05
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	7.8E-07	mg/kg-day	1.00E-02	mg/kg-day			7.8E-05
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	1.2E-07	mg/kg-day	1.00E-02	mg/kg-day			1.2E-05
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	4.7E-07	mg/kg-day	6.00E-03	mg/kg-day			7.8E-05
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	6.5E-08	mg/kg-day	3.00E-03	mg/kg-day			2.2E-05
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	4.6E-10	mg/kg-day		mg/kg-day			
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	2.0E-09	mg/kg-day		mg/kg-day			
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	2.5E-09	mg/kg-day	5.00E-04	mg/kg-day			4.9E-06
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	8.0E-04	mg/kg-day	1.00E+00	mg/kg-day			8.0E-04
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	3.2E-07	mg/kg-day	3.00E-04	mg/kg-day			1.1E-03
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	1.2E-06	mg/kg-day	3.00E-03	mg/kg-day			4.1E-04
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	9.2E-04	mg/kg-day	6.00E-01	mg/kg-day			1.5E-03
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	1.5E-06	mg/kg-day		mg/kg-day			
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	2.1E-05	mg/kg-day	4.60E-02	mg/kg-day			4.5E-04
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	8.5E-09	mg/kg-day	3.00E-04	mg/kg-day			2.8E-05
	(total)												4.5E-03
Dermal	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	4.6E-08	mg/kg-day	2.00E-02	mg/kg-day			2.3E-06
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	3.4E-08	mg/kg-day	2.00E-02	mg/kg-day			1.7E-06
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	8.3E-08	mg/kg-day	1.00E-02	mg/kg-day			8.3E-06
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	6.4E-07	mg/kg-day	1.00E-02	mg/kg-day			6.4E-05
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	6.3E-07	mg/kg-day	1.00E-02	mg/kg-day			6.3E-05
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	7.0E-07	mg/kg-day	6.00E-03	mg/kg-day			1.2E-04
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	3.3E-08	mg/kg-day	3.00E-03	mg/kg-day			1.1E-05
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	2.8E-08	mg/kg-day		mg/kg-day			
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	1.1E-07	mg/kg-day		mg/kg-day			
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	2.4E-07	mg/kg-day	5.00E-04	mg/kg-day			4.8E-04
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	5.0E-05	mg/kg-day	1.00E+00	mg/kg-day			5.0E-05
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	2.0E-08	mg/kg-day	3.00E-04	mg/kg-day			6.7E-05
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	1.5E-07	mg/kg-day	7.50E-05	mg/kg-day			2.0E-03
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	5.7E-05	mg/kg-day	6.00E-01	mg/kg-day			9.6E-05
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	9.5E-08	mg/kg-day		mg/kg-day			
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	1.3E-06	mg/kg-day	1.84E-03	mg/kg-day			7.0E-04
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	5.3E-10	mg/kg-day	2.10E-05	mg/kg-day			2.5E-05
	(total)												3.7E-03
												Total Hazard Index Across All Exposure Routes/Pathways	**8.2E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 8.8 A
REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	3.6E-08	mg/kg-day	6.20E-02	$(mg/kg-day)^{-1}$	2.2E-09
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	2.9E-08	mg/kg-day	8.40E-02	$(mg/kg-day)^{-1}$	2.4E-09
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	5.8E-08	mg/kg-day	6.10E-03	$(mg/kg-day)^{-1}$	3.5E-10
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	4.5E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	6.8E-08	mg/kg-day	5.20E-02	$(mg/kg-day)^{-1}$	3.5E-09
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	2.7E-07	mg/kg-day	1.10E-02	$(mg/kg-day)^{-1}$	2.9E-09
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	3.7E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	5.6E-08
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	2.6E-10	mg/kg-day	2.40E-01	$(mg/kg-day)^{-1}$	6.3E-11
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	1.2E-09	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	4.0E-10
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	1.4E-09	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	4.8E-10
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	4.6E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	1.8E-07	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	2.8E-07
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	7.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	5.3E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	8.7E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	1.2E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	4.8E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										3.4E-07
Dermal	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	2.3E-08	mg/kg-day	6.20E-02	$(mg/kg-day)^{-1}$	1.4E-09
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	1.7E-08	mg/kg-day	8.40E-02	$(mg/kg-day)^{-1}$	1.4E-09
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	4.4E-08	mg/kg-day	6.10E-03	$(mg/kg-day)^{-1}$	2.7E-10
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	3.5E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	3.1E-07	mg/kg-day	5.20E-02	$(mg/kg-day)^{-1}$	1.6E-08
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	3.6E-07	mg/kg-day	1.10E-02	$(mg/kg-day)^{-1}$	4.0E-09
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	1.9E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	2.9E-08
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	1.4E-08	mg/kg-day	2.40E-01	$(mg/kg-day)^{-1}$	3.3E-09
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	5.2E-08	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	1.8E-08
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	1.2E-07	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	4.1E-08
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	3.5E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	1.4E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	2.1E-08
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	1.1E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	4.0E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	6.7E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	9.1E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	3.7E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										1.4E-07
											4.8E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.8 B
CENTRAL TENDANCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT RECREATIONAL USERS TO SEDIMENT
SITE 17 - NORTH BRANCH OF PETTIBONE CREEK
NTC GREAT LAKES

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: North Branch of Pettybone Creek
Receptor Population: Recreational User
Receptor Age: Adolescent (7 to 16 years old)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	9.0E-09	mg/kg-day	6.20E-02	$(mg/kg-day)^{-1}$	5.6E-10
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	7.1E-09	mg/kg-day	8.40E-02	$(mg/kg-day)^{-1}$	6.0E-10
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	1.5E-08	mg/kg-day	6.10E-03	$(mg/kg-day)^{-1}$	8.9E-11
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	1.1E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	1.7E-08	mg/kg-day	5.20E-02	$(mg/kg-day)^{-1}$	8.8E-10
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	6.7E-08	mg/kg-day	1.10E-02	$(mg/kg-day)^{-1}$	7.3E-10
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	9.3E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.4E-08
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	6.5E-11	mg/kg-day	2.40E-01	$(mg/kg-day)^{-1}$	1.6E-11
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	2.9E-10	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	9.9E-11
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	3.5E-10	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	1.2E-10
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	1.1E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	4.6E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	6.9E-08
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	1.7E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	1.3E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	2.2E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	3.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	1.2E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										8.6E-08
Dermal	Bromodichloromethane	7.40E-01	ug/L	7.40E-01	ug/L	M	6.6E-09	mg/kg-day	6.20E-02	$(mg/kg-day)^{-1}$	4.1E-10
	Chlorodibromomethane	5.90E-01	ug/L	5.90E-01	ug/L	M	4.9E-09	mg/kg-day	8.40E-02	$(mg/kg-day)^{-1}$	4.1E-10
	Chloroform	1.20E+00	ug/L	1.20E+00	ug/L	M	1.2E-08	mg/kg-day	6.10E-03	$(mg/kg-day)^{-1}$	7.2E-11
	cis-1,2-Dichloroethene	9.20E+00	ug/L	9.20E+00	ug/L	M	9.1E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Tetrachloroethene	1.40E+00	ug/L	1.40E+00	ug/L	M	9.0E-08	mg/kg-day	5.20E-02	$(mg/kg-day)^{-1}$	4.7E-09
	Trichloroethene	5.50E+00	ug/L	5.50E+00	ug/L	M	9.9E-08	mg/kg-day	1.10E-02	$(mg/kg-day)^{-1}$	1.1E-09
	Vinyl Chloride	7.70E-01	ug/L	7.70E-01	ug/L	M	4.7E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	7.1E-09
	4,4'-DDD	5.40E-03	ug/L	5.40E-03	ug/L	M	3.9E-09	mg/kg-day	2.40E-01	$(mg/kg-day)^{-1}$	9.5E-10
	4,4'-DDE	2.40E-02	ug/L	2.40E-02	ug/L	M	1.5E-08	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	5.1E-09
	4,4'-DDT	2.90E-02	ug/L	2.90E-02	ug/L	M	3.5E-08	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	1.2E-08
	Aluminum	9.46E+03	ug/L	9.46E+03	ug/L	M	7.1E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	3.80E+00	ug/L	3.80E+00	ug/L	M	2.9E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	4.3E-09
	Chromium	1.44E+01	ug/L	1.44E+01	ug/L	M	2.2E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	1.09E+04	ug/L	1.09E+04	ug/L	M	8.2E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	1.80E+01	ug/L	1.80E+01	ug/L	M	1.4E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	2.45E+02	ug/L	2.45E+02	ug/L	M	1.8E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	1.00E-01	ug/L	1.00E-01	ug/L	M	7.5E-11	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										3.6E-08
											1.2E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.